HIGHER SECONDARY – SECOND YEAR

Supporting Material

COMPUTER SCIENCE

PREPARATION TEAM

V.G. RAMAKRISHNAN
Karnataka Sanga Hr. Sec. School,
T. Nagar, Chennai 600 017

K. KANNAN
Chennai Girls Hr. Sec. School,
Rotler Street, Chennai 600 112

N.V. GOWRISHANKAR
Chennai Girls Hr. Sec. School,
Nungambakkam, Chennai 600 034

A. SAGAR BABU
SMB Jain Hr. Sec. School,
T. Nagar, Chennai 600 017

K. LENIN
Chennai Girls Hr. Sec. School,
Saidapet, Chennai 600 015

SIVA SARAVANAN,
Chennai Hr. Sec. School,
M.G.R. Nagar, Chennai 600 083

CHENNAI EDUCATIONAL DISTRICT

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COMPUTER SCIENCE

CHAPTER 1
FUNCTION

PART – I

CHOOSE THE BEST ANSWER:

1. The small sections of code that are used to perform a particular task is called

(A) Subroutines (B) Files
(C) Pseudo code (D) Modules

2. Which of the following is a unit of code that is often defined within a greater code structure?

(A) Subroutines **(B) Function**
(C) Files (D) Modules

3. Which of the following is a distinct syntactic block?

(A) Subroutines (B) Function
(C) Definition (D) Modules

4. The variables in a function definition are called as

(A) Subroutines (B) Function
(C) Definition **(D) Parameters**

5. The values which are passed to a function definition are called

(A) Arguments (B) Subroutines
(C) Function (D) Definition

6. Which of the following are mandatory to write the type annotations in the function definition?

(A) Curly braces **(B) Parentheses**
(C) Square brackets (D) indentations

7. Which of the following defines what an object can do?

(A) Operating System (B) Compiler
(C) Interface (D) Interpreter

8. Which of the following carries out the instructions defined in the interface?

(A) Operating System (B) Compiler
(C) Implementation (D) Interpreter

9. The functions which will give exact result when same arguments are passed are called

(A) Impure functions (B) Partial Functions
(C) Dynamic Functions **(D) Pure functions**

10. The functions which cause side effects to the arguments passed are called

(A) Impure function (B) Partial Functions
(C) Dynamic Functions (D) Pure functions

CHAPTER 2
DATA ABSTRACTION

1. Which of the following functions those build the abstract data type?

(A) Constructors (B) Destructors
(C) recursive (D) Nested

2. Which of the following functions that retrieve information from the data type?

(A) Constructors **(B) Selectors**
(C) recursive (D) Nested

3. The data structure which is a mutable ordered sequence of elements is called

(A) Built in **(B) List**
(C) Tuple (D) Derived data

4. A sequence of immutable objects is called

(A) Built in (B) List
(C) Tuple (D) Derived data

5. The data type whose representation is known are called

(A) Built in datatype (B) Derived datatype
(C) Concrete datatype (D) Abstract datatype

6. The data type whose representation is unknown are called

(A) Built in datatype (B) Derived datatype
(C) Concrete datatype **(D) Abstract datatype**

7. Which of the following is a compound structure?

(A) Pair (B) Triplet
(C) single (D) quadrat

8. Bundling two values together into one can be considered as
(A) Pair (B) Triplet
(C) single (D) quadrat

9. Which of the following allow to name the various parts of a multi-item object?
(A) Tuples (B) Lists
(C) Classes (D) quadrats

10. Which of the following is constructed by placing expressions within square brackets?
(A) Tuples (B) Lists
(C) Classes (D) quadrats

CHAPTER 3
SCOPING

1. Which of the following refers to the visibility of variables in one part of a program to another part of the same program?
(A) Scope (B) Memory
(C) Address (D) Accessibility

2. The process of binding a variable name with an object is called
(A) Scope **(B) Mapping**
(C) late binding (D) early binding

3. Which of the following is used in programming languages to map the variable and object?
(A) :: (B) := **(C) =** (D) ==

4. Containers for mapping names of variables to objects is called
(A) Scope (B) Mapping
(C) Binding **(D) Namespaces**

5. Which scope refers to variables defined in current function?
(A) Local Scope (B) Global scope
(C) Module scope (D) Function Scope

6. The process of subdividing a computer program into separate sub-programs is called
(A) Procedural Programming
(B) Modular programming
(C) Event Driven Programming
(D) Object oriented Programming

7. Which of the following security technique that regulates who can use resources in a computing environment?
(A) Password (B) Authentication
(C) Access control (D) Certification

8. Which of the following members of a class can be handled only from within the class?
(A) Public members (B) Protected members
(C) Secured members **(D) Private members**

9. Which members are accessible from outside the class?
(A) Public members (B) Protected members
(C) Secured members (D) Private members

10. The members that are accessible from within the class and are also available to its sub-classes is called
(A) Public members **(B) Protected members**
(C) Secured members (D) Private members

CHAPTER 4
ALGORITHMIC STRATEGIES

1. The word comes from the name of a Persian mathematician Abu Ja'far Mohammed ibn-i Musa al Khowarizmi is called?
(A) Flowchart (B) Flow
(C) Algorithm (D) Syntax

2. From the following sorting algorithms which algorithm needs the minimum number of swaps?
(A) Bubble sort (B) Quick sort
(C) Merge sort (D) Selection sort

3. Two main measures for the efficiency of an algorithm are
(A) Processor and memory
(B) Complexity and capacity
(C) Time and space (D) Data and space

4. The complexity of linear search algorithm is
(A) O(n) (B) O(log n)
(C) O(n2) (D) O(n log n)

5. From the following sorting algorithms which has the lowest worst case complexity?
(A) Bubble sort (B) Quick sort
(C) Merge sort (D) Selection sort

6. Which of the following is not a stable sorting algorithm?
(A) Insertion sort (B) Selection sort
(C) Bubble sort **(D) Quick sort**

7. Time complexity of bubble sort in best case is
(A) θ (n) (B) θ (nlogn)
(C) θ (n2) (D) θ (n(logn) 2)

8. The Θ notation in asymptotic evaluation represents
(A) Base case (B) Average case
(C) Worst case (D) NULL case

9. If a problem can be broken into subproblems which are reused several times, the problem possesses which property?
(A) Overlapping subproblems
(B) Optimal substructure
(C) Memoization (D) Greedy

10. In dynamic programming, the technique of storing the previously calculated values is called?
(A) Saving value property
(B) Storing value property
(C) Memoization (D) Mapping

Chapter - 5

PYTHON - VARIABLES AND OPERATORS

1. Who developed Python?
(A) Ritche **(B) Guido Van Rossum**
(C) Bill Gates (D) Sunder Pitchai

2. The Python prompt indicates that Interpreter is ready to accept instruction.
(A) >>> (B) <<<
(C) # (D) <<

3. Which of the following shortcut is used to create new Python Program?
(A) Ctrl + C (B) Ctrl + F
(C) Ctrl + B **(D) Ctrl + N**

4. Which of the following character is used to give comments in Python Program?
(A) # (B) &
(C) @ (D) $

5. This symbol is used to print more than one item on a single line.
(A) Semicolon(;) (B) Dollor($)
(C) comma(,) (D) Colon(:)

6. Which of the following is not a token?
(A) Interpreter (B) Identifiers
(C) Keyword (D) Operators

7. Which of the following is not a Keyword in Python?
(A) break (B) while
(C) continue **(D) operators**

8. Which operator is also called as Comparative operator?
(A) Arithmetic **(B) Relational**
(C) Logical (D) Assignment

9. Which of the following is not logical operator?
(A) and (B) Or
(C) Not **(D) Assignment**

10. Which operator is also called as Conditional operator?
(A) Ternary (B) Relational
(C) Logical (D) Assignment

Chapter – 6

CONTROL STRUCTURES

1. How many important control structures are there in Python?

(A) 3 (B) 4

(C) 5 (D) 6

2. elif can be considered to be abbreviation of

(A) nested if **(B) if..else**

(C) else if (D) if..elif

3. What plays a vital role in Python programming?

(A) Statements (B) Control

(C) Structure **(D) Indentation**

4. Which statement is generally used as a placeholder?

(A) continue (B) break

(C) pass (D) goto

5. The condition in the if statement should be in the form of

(A) Arithmetic or Relational expression

(B) Arithmetic or Logical expression

(C) Relational or Logical expression

(D) Arithmetic

6. Which is the most comfortable loop?

(A) do..while (B) while

(C) for (D) if..elif

7. What is the output of the following snippet?

```
i=1
while True:
    if i%3 ==0:
        break
    print(i,end='')
    i +=1
```

(A) 12 (B) 123

(C) 1234 (D) 124

8. What is the output of the following snippet?

```
T=1
while T:
    print(True)
    break
```

(A) False **(B) True**

(C) 0 (D) no output

9. Which amongst is not a jump statement?

(A) for (B) goto

(C) continue (D) break

10. Which punctuation should be used in the block?

```
if <condition>…….
    statements-block 1
else:
    statements-block 2
```

(A) ; **(B) :**

(C) :: (D) !

Chapter – 7

PYTHON FUNCTIONS

1. A named blocks of code that are designed to do one specific job is called as

(A) Loop (B) Branching

(C) Function (D) Block

2. A Function which calls itself is called as

(A) Built-in **(B) Recursion**

(C) Lambda (D) return

3. Which function is called anonymous un-named function?

(A) Lambda (B) Recursion

(C) Function (D) define

4. Which of the following keyword is used to begin the function block?

(A) define (B) for

(C) finally **(D) def**

5. Which of the following keyword is used to exit a function block?
(A) define **(B) return**
(C) finally (D) def

6. While defining a function which of the following symbol is used.
(A) ; (semicolon) (B) . (dot)
(C) : (colon) (D) $ (dollar)

7. In which arguments the correct positional order is passed to a function?
(A) Required (B) Keyword
(C) Default (D) Variable-length

8. Read the following statement and choose the correct statement(s).
(I) In Python, you don’t have to mention the specific data types while defining function.
(II) Python keywords can be used as function name.
(A) I is correct and II is wrong
(B) Both are correct
(C) I is wrong and II is correct
(D) Both are wrong

9. Pick the correct one to execute the given statement successfully.
if ____ : print(x, " is a leap year")
(A) x%2=0 **(B) x%4==0**
(C) x/4=0 (D) x%4=0

10. Which of the following keyword is used to define the function testpython()?
(A) define (B) pass
(C) def (D) while

Chapter – 8

STRINGS AND STRING MANIPULATION

1. Which of the following is the output of the following python code?
str1="TamilNadu"
print(str1[::-1])
(A) Tamilnadu (B) Tmlau
(C) udanlimaT **(D) udaNlimaT**

2. What will be the output of the following code?
str1 = "Chennai Schools"
str1[7] = "-"
(A) Chennai-Schools (B) Chenna-School
(C) Type error (D) Chennai

3. Which of the following operator is used for concatenation?
(A) + (B) & (C) * (D) =

4. Defining strings within triple quotes allows creating:
(A) Single line Strings **(B) Multiline Strings**
(C) Double line Strings (D) Multiple Strings

5. Strings in python:
(A) Changeable (B) Mutable
(C) Immutable (D) flexible

6. Which of the following is the slicing operator?
(A) { } **(B) [ ]** (C) < > (D) ( )

7. What is stride?
(A) index value of slide operation
(B) first argument of slice operation
(C) second argument of slice operation
(D) third argument of slice operation

8. Which of the following formatting character is used to print exponential notation in upper case?
(A) %e **(B) %E** (C) %g (D) %n

9. Which of the following is used as placeholders or replacement fields which get replaced along with format( ) function?
(A) { } (B) < > (C) ++ (D) ^^

10. The subscript of a string may be:
(A) Positive (B) Negative
(C) Both (a) and (b) (D) Either (a) or (b)

Chapter – 9
LISTS, TUPLES, SETS AND DICTIONARY

1. Pick odd one in connection with collection data type
(A) List (B) Tuple
(C) Dictionary **(D) Loop**

2. Let list1=[2,4,6,8,10], then print(List1[-2]) will result in
(A) 10 **(B) 8** (C) 4 (D) 6

3. Which of the following function is used to count the number of elements in a list?
(A) count( ) (B) find( )
(C)len( ) (D) index( )

4. If List=[10,20,30,40,50] then List[2]=35 will result
(A) [35,10,20,30,40,50] (B) [10,20,30,40,50,35]
(C) [10,20,35,40,50] (D) [10,35,30,40,50]

5. If List=[17,23,41,10] then List.append(32) will result
(A) [32,17,23,41,10] **(B) [17,23,41,10,32]**
(C) [10,17,23,32,41] (D) [41,32,23,17,10]

6. Which of the following Python function can be used to add more than one element within an existing list?
(A) append( ) (B) append_more( )
(C) extend( ) (D) more( )

7. What will be the result of the following Python code?

```
S=[x**2 for x in range(5)]
print(S)
```

(A) [0,1,2,4,5] **(B) [0,1,4,9,16]**
(C) [0,1,4,9,16,25] (D) [1,4,9,16,25]

8. What is the use of type() function in python?
(A) To create a Tuple
(B) To know the type of an element in tuple
(C) To know the data type of python object
(D) To create a list

9. Which of the following statement is not correct?
(A) A list is mutable
(B) A tuple is immutable.
(C) The append() function is used to add an element.
(D) The extend() function is used in tuple to add elements in a list.

10. Let setA={3,6,9}, setB={1,3,9}. What will be the result of the following snippet?

```
print(setA|setB)
```

(A) {3,6,9,1,3,9} (B) {3,9}
(C) {1} **(D) {1,3,6,9}**

11. Which of the following set operation includes all the elements that are in two sets but not the one that are common to two sets?
(A) Symmetric difference (B) Difference
(C) Intersection (D) Union

12. The keys in Python, dictionary is specified by
(A) = (B) ; (C)+ **(D) :**

Chapter – 10
CLASSES AND OBJECTS

1. Which of the following are the key features of an Object Oriented Programming language?
(A) Constructor and Classes
(B) Constructor and Object
(C) Classes and Objects
(D) Constructor and Destructor

2. Functions defined inside a class:
(A) Functions (B) Module
(C) Methods (D) section

3. Class members are accessed through which operator?
(A) & **(B) .** (C) # (D) %

4. Which of the following method is automatically executed when an object is created?
(A) __object__( ) (B) __del__( )
(C) __func__( ) **(D) __init__( )**

5. A private class variable is prefixed with
(A) __ (B) && (C) ## (D) **

6. Which of the following method is used as destructor?
(A) __init__( )　　(B) __dest__( )
(C) __rem__( )　　**(D) __del__( )**

7. Which of the following class declaration is correct?
(A) class class_name
(B) class class_name<>
(C) class class_name:
(D) class class_name[ ]

8. Which of the following is the output of the following program?

```
        class Student:
                def __init__(self, name):
                        self.name=name
                        print(name)
                S=Student("Tamil")
```

(A) Error　　**(B) Tamil**
(C) name　　(D) self

9. Which of the following is the private class variable?
(A) __num　　(B) ##num
(C) $$num　　(D) &&num

10. The process of creating an object is called as:
(A) Constructor　　(B) Destructor
(C) Initialize　　**(D) Instantiation**

CHAPTER 11
DATABASE CONCEPTS

1. What is the acronym of DBMS?
(A) DataBase Management Symbol
(B) Database Managing System
(C) DataBase Management System
(D) DataBasic Management System

2. A table is known as
(A) tuple　　(B) attribute
(C) relation　　(D) entity

3. Which database model represents parent-child relationship?
(A) Relational　　(B) Network
(C) Hierarchical　　(D) Object

4. Relational database model was first proposed by
(A) E F Codd　　(B) E E Codd
(C) E F Cadd　　(D) E F Codder

5. What type of relationship does hierarchical model represents?
(A) one-to-one　　**(B) one-to-many**
(C) many-to-one　　(D) many-to-many

6. Who is called Father of Relational Database from the following?
(A) Chris Date　　(B)Hugh Darween
(C) Edgar Frank Codd　　(D) Edgar Frank Cadd

7. Which of the following is an RDBMS?
(A) Dbase　　(B) Foxpro
(C) Microsoft Access　　**(D) SQLite**

8 What symbol is used for SELECT statement?
(A) σ　　(B) Π　　(C) X　　(D) Ω

9 A tuple is also known as
(A) table　　**(B) row**
(C) attribute　　(D) field

10. Who developed ER model?
(A) Chen　　(B) EF Codd
(C) Chend　　(D) Chand

Chapter 12
STRUCTURED QUERY LANGUAGE

1. Which commands provide definitions for creating table structure, deleting relations, and modifying relation schemas?
(A) DDL (B) DML
(C) DCL (D) DQL

2. Which command lets to change the structure of the table?
(A) SELECT (B) ORDER BY
(C) MODIFY **(D) ALTER**

3. The command to delete a table is
(A) DROP (B) DELETE
(C) DELETE ALL (D) ALTER TABLE

4. Queries can be generated using
(A) SELECT (B) ORDER BY
(C) MODIFY (D) ALTER

5. The clause used to sort data in a database
(A) SORT BY **(B) ORDER BY**
(C) GROUP BY (D) SELECT

6. Expand: SQL
(A) Structured Query Language .
(B) Structured Question Language
(C) Sorted Query Language
(D) Sorted Question Language

7. Expand: RDBMS
(A) Regional Data Base Maintenance System
(B) Relational Data Base Maintenance System
(C) Regional Data Base Management System
(D) Relational Data Base Management System

8. CRUD means
(A) Create, Retrieved, Upload, Delete
(B) Change, Read, Upload, Delete
(C) Create, Reset, Update, Download
(D) Create, Read, Update, Delete

9. Expand: DDL
(A) Data Definition Language
(B) Data Delivery Language
(C) Data Defined Link
(D) Data Delivery Link

10. Expand: DML
(A) Data Maintenance Link
(B) Data Manipulation Link
(C) Data Maintenance Language
(D) Data Manipulation Language

11. Expand: EDML
(A) Export Data Maintenance Link
(B) Embedded Data Maintenance Link
(C) Embedded Data Manipulation Language
(D) Export Data Manipulation Language

12. Expand: DCL
(A) Data Connect Language
(B) Data Connect Link
(C) Data Control Link
(D) Data Control Language

13. Expand: TCL
(A) Transfer Connect Link
(B) Transaction Connect Language
(C) Transaction Control Language
(D) Transfer Control Link

14. Expand: DQL
(A) Data Question Language
(B) Data Query Language
(C) Data Question Link
(D) Data Query Link

Chapter 13

PYTHON AND CSV FILES

1. A CSV file is also known as a
(A) Flat File (B) 3D File
(C) String File (D) Random File

2. The expansion of CRLF is
(A) Control Return and Line Feed
(B) Carriage Return and Form Feed
(C) Control Router and Line Feed
(D) Carriage Return and Line Feed

3. Which of the following module is provided by Python to do several operations on the CSV files?
(A) py (B) xls
(C) csv (D) os

4. Which of the following mode is used when dealing with non-text files like image or exe files?
(A) Text mode **(B) Binary mode**
(C) xls mode (D) csv mode

5. The command used to skip a row in a CSV file is
(A) next( ) (B) skip( )
(C) omit( ) (D) bounce( )

6. Which of the following is a string used to terminate lines produced by writer() method of csv module?
(A) Line Terminator (B) Enter key
(C) Form feed (D) Data Terminator

7. What is the output of the following program?

```
import csv
d=csv.reader(open('c:\......\......\city.csv'))
next(d)
for row in d:
    print(row)
```

if the file called "city.csv" contain the following details
chennai,mylapore
mumbai,andheri

(A) chennai,mylapore
(B) mumbai,andheri

(C) chennai
mumbai

(D) chennai,mylapore
mumbai,andheri

8. Which of the following creates an object which maps data to a dictionary?
(A) listreader( ) (B) reader( )
(C) tuplereader( ) **(D) DicReader( )**

9. Making some changes in the data of the existing file or adding more data is called
(A) Editing **(B) Appending**
(C) Modification (D) Alteration

10. What will be written inside the file test.csv using the following program?

```
import csv
 D = [['Exam'],['Quarterly'],['Halfyearly']]
     csv.register_dialect('M',lineterminato
     r = '\n')
     with open('c:\pyprg\ch13\line2.csv',
     'w') as f:
          wr = csv.writer(f,dialect='M')
   wr.writerows(D)
     f.close()
```

(A) Exam Quarterly Halfyearly
(B) Exam Halfyearly Quarterly
(C) E
Q
H
(D) Exam,
Quarterly
Halfyearly

CHAPTER 14
IMPORTING C++ PROGRAMS IN PYTHON

1. Which of the following is not a scripting language?
(A) JavaScript (B) PHP
(C) Perl **(D) HTML**

2. Importing C++ program in a Python program is called
(A) wrapping (B) Downloading
(C) Interconnecting (D) Parsing

3. The expansion of API is
(A) Application Programming Interpreter
(B) Application Programming Interface
(C) Application Performing Interface
(D) Application Programming Interlink

4. A framework for interfacing Python and C++ is
(A) Ctypes (B) SWIG
(C) Cython **(D) Boost**

5. Which of the following is a software design technique to split your code into separate parts?
(A) Object oriented Programming
(B) Modular programming
(C) Low Level Programming

(D) Procedure oriented Programming

6. The module which allows you to interface with the Windows operating system is
(A) OS module (B) sys module
(C) csv module (D) getopt module

7. getopt( ) will return an empty array if there is no error in splitting strings to
(A) argv variable (B) opt variable
(C) args variable (D) ifile variable

8. Identify the function call statement in the following snippet.

```
if __name__ =='__main__':
main(sys.argv[1:])
```

(A) main(sys.argv[1:]) (B) __name__
(C) __main__ (D) argv

9. Which of the following can be used for processing text, numbers, images, and scientific data?
(A) HTML (B) C
(C) C++ **(D) PYTHON**

10. What does __name__ contains ?
(A) C++ filename (B) main( ) name
(C) Python filename (D) OS module name

CHAPTER 15
DATA MANIPULATION THROUGH SQL

1. Which of the following is an organized collection of data?
(A) Database (B) DBMS
(C) Information (D) Records

2. SQLite falls under which database system?
(A) Flat file database system
(B) Relational Database system
(C) Hierarchical database system
(D) Object oriented Database system

3. Which of the following is a control structure used to traverse and fetch the records of the database?
(A) Pointer (B) Key
(C) Cursor (D) Insertion point

4. Any changes made in the values of the record should be saved by the command
(A) Save (B) Save As
(C) Commit (D) Oblige

5. Which of the following executes the SQL command to perform some action?
(A) Execute() (B) Key()
(C) Cursor() (D) run()

6. Which of the following function retrieves the average of a selected column of rows in a table?
(A) Add() (B) SUM()
(C) AVG() **(D) AVERAGE()**

7. The function that returns the largest value of the selected column is
(A) MAX() (B) LARGE()
(C) HIGH() (D) MAXIMUM()

8. Which of the following is called the master table?
(A) sqlite_master (B) sql_master
(C) main_master (D) master_main

9. The most commonly used statement in SQL is
(A) cursor **(B) select**
(C) execute (D) commit

10. Which of the following clause avoid the duplicate?
(A) Distinct (B) Remove
(C) Where (D) GroupBy

Chapter 16
DATA VISUALIZATION USING PYPLOT:
LINE CHART, PIE CHART AND BAR CHART

1. Which is a python package used for 2D graphics?

(A) matplotlib.pyplot (B) matplotlib.pip

(C) matplotlib.numpy (D) matplotlib.plt

2. Identify the package manager for Python packages, or modules.

(A) Matplotlib (B) PIP

(C) plt.show( ) **(D) python package**

3. Read the following code: Identify the purpose of this code and choose the right option from the following.

C:\Users\YourName\AppData\Local\Programs\Python\Python36-32\Scripts>pip –version

(A) Check if PIP is Installed (B) Install PIP

(C) Download a Package

(D) Check PIP version

4. Read the following code: Identify the purpose of this code and choose the right option from the following.

C:\Users\Your Name\AppData\Local\Programs\Python\Python36-32\Scripts>pip list

(A) List installed packages (B) list command

(C) Install PIP (D) packages installed

5. To install matplotlib, the following function will be typed in your command prompt.

What does “-U”represents?

Python –m pip install –U pip

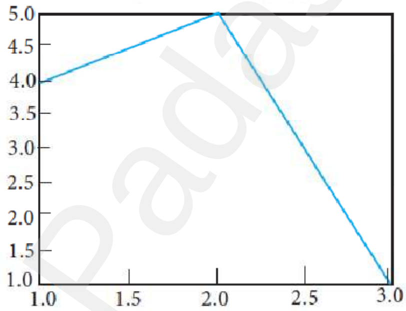
(A) downloading pip to the latest version

(B) upgrading pip to the latest version

(C) removing pip

(D) upgrading matplotlib to the latest version

6. Observe the output figure. Identify the coding for obtaining this output.



(A) import matplotlib.pyplot as plt
plt.plot([1,2,3],[4,5,1])
plt.show()

(B) import matplotlib.pyplot as plt
plt.plot([1,2],[4,5])
plt.show()

(C) import matplotlib.pyplot as plt
plt.plot([2,3],[5,1])
plt.show()

(D) import matplotlib.pyplot as plt
plt.plot([1,3],[4,1])
plt.show()

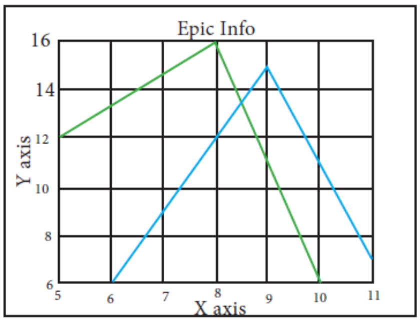
7. Read the code:

```
import matplotlib.pyplot as plt
plt.plot(3,2)
```

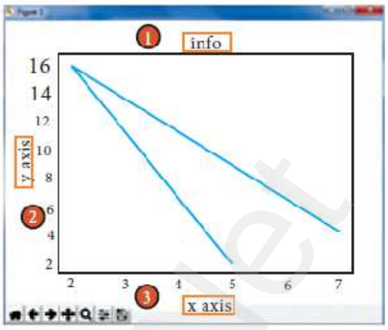
```
    plt.show()
```

Identify the output for the above coding.

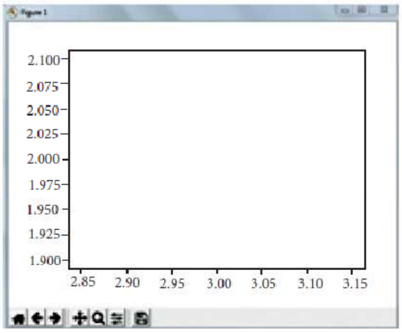
(A)



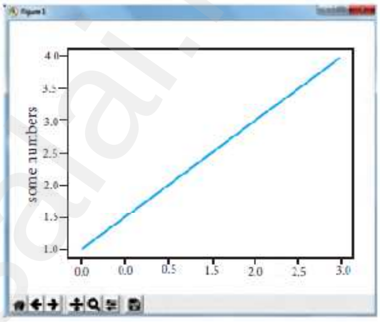
(B)



(C)



(D)



8. Which key is used to run the module?

(A) F6 (B) F4

(C) F3 **(D) F5**

9. Identify the right type of chart using the following hints.

Hint 1: This chart is often used to visualize a trend in data over intervals of time.

Hint 2: The line in this type of chart is often drawn chronologically.

(A) Line chart (B) Bar chart

(C) Pie chart (D) Scatter plot

10. Read the statements given below. Identify the right option from the following for pie chart.

Statement A: To make a pie chart with Matplotlib, we can use the plt.pie() function.

Statement B: The autopct parameter allows us to display the percentage value using the Python string formatting.

(A) Statement A is correct

(B) Statement B is correct

(C) Both the statements are correct

(D) Both the statements are wrong

****

PART – II

(2 MARKS)

ANSWER THE FOLLOWING QUESTIONS

1. What is a subroutine?

- Subroutines are the basic building blocks of computer programs.
- Subroutines are small sections of code that are used to perform a particular task that can be used repeatedly.

2. Define Function with respect to Programming language.

- A function is a unit of code that is oft en defined within a greater code structure.

3. Write the inference you get from X:=(78).

(X : int)

4. Differentiate interface and implementation.

Interface	Implementation
Interface just defines what an object can do, but won't actually do it	Implementation carries out the instructions defined in the interface

5. Which of the following is a normal function definition and which is recursive function definition?

i) let rec sum x y:
return x + y

ii) let disp :
print 'welcome'

iii) let rec sum num:
if (num!=0) then return num + sum (num-1)
else
return num

Answer:

(i) Recursive function

(ii) Normal function

(iii) Recursive function

6. What is subroutine?

- Subroutines are the basic building blocks of computer programs.
- Subroutines are small sections of code that are used to perform a particular task that can be used repeatedly.
- In Programming languages these subroutines are called as Functions.

7. What is pure function?

- Pure functions are functions which will give exact result when the same arguments are passed.

8. What is impure function?

- The variables used inside the function may cause side effects though the functions which are not passed with any arguments.
- In such cases the function is called impure function.

9. What is abstract data type?

- Abstract Data type (ADT) is a type (or class) for objects whose behavior is defined by a set of value and a set of operations.

10. Differentiate constructors and selectors.

Constructor	Selectors
Constructors are functions that build the abstract data type.	Selectors are functions that retrieve information from the data type.

11. What is a Pair? Give an example.

- Any way of bundling two values together into one can be considered as a pair.
- Example:
  lst[(0, 10), (1, 20)]

12. What is a List? Give an example.

- List is constructed by placing expressions within square brackets separated by commas.
  - Example: lst := [10, 20]

13. What is a Tuple? Give an example.

- A tuple is a comma-separated sequence of values surrounded with parentheses.

14. What is ADT?

- ADT - Abstract Data type is a type (or class) for objects whose behavior is defined by a set of value and a set of operations.

15. What is wishful thinking?

- Wishful Thinking is the formation of beliefs and making decisions according to what might be pleasing to imagine instead of by appealing to reality.

16. What is a scope?

- Scope refers to the visibility of variables, parameters and functions in one part of a program to another part of the same program.

17. Why scope should be used for variable? State the reason.

- The changes inside the function can't affect the variable on the outside of the function in unexpected ways.

18. What is mapping?

- The process of binding a variable name with an object is called mapping.

19. What do you mean by Namespaces?

- Namespaces are containers for mapping names of variables to objects.

20. How Python represents the private and protected Access specifiers?

- Python prescribes a convention of prefixing the name of the variable/method with single or double underscore to emulate the behavior of protected and private access specifiers.

21. What is an Algorithm?

- An algorithm is a finite set of instructions to accomplish a particular task.
- It is a step-by-step procedure for solving a given problem.

22. Define Pseudo code.

- It's simply an implementation of an algorithm in the form of annotations and informative text written in plain English.
- It has no syntax like any of the programming language and thus can't be compiled or interpreted by the computer.

23. What is Sorting?

- Arranging elements (values) in a sequential order.

24. What is searching? Write its types.

- Finding a particular element (value) from a set is called as searching.
- Types of searching:
  - o Linear Search
  - o Binary Search

25. What are the different modes that can be used to test Python Program?

- Interactive Mode
- Script Mode

26. Write short notes on Tokens.

- Python breaks each logical line into a sequence of elementary lexical components known as Tokens.
- The normal token types are
  1) Identifiers,
  2) Keywords,
  3) Operators,
  4) Delimiters and
  5) Literals.

27. What are the different operators that can be used in Python?

1) Arithmetic operators
2) Relational or Comparative operators
3) Logical operators
4) Assignment operators
5) Conditional operator

28. What is a literal? Explain the types of literals?

- Literal is a raw data given in a variable or constant.

Types of Literals:

- **Numeric Literals**
  - o Numeric Literals consists of digits and are immutable (unchangeable).
  - o Numeric literals can belong to 3 different numerical types Integer, Float and Complex.
- **String Literals**
  - o In Python a string literal is a sequence of characters surrounded by quotes.
- **Boolean Literals**
  - o A Boolean literal can have any of the two values: True or False.
- **Escape Sequences**
  - o In Python strings, the backslash "\" is a special character, also called the "escape" character.

29. Write short notes on Exponent data?

An Exponent data contains decimal digit part, decimal point, exponent part followed by one or more digits.

Example: 12.E04, 24.e04

30. List the control structures in Python.

- Sequential
- Alternative or Branching
- Iterative or Looping

31. Write note on break statement.

- The break is a jump statement.
- The breakstatement terminates the loop containing it.

32. Write the syntax of if..else statement

```
if <condition>:
    statements-block 1
else:
    statements-block 2
```

33. Define control structure.

A program statement that causes a jump of control from one part of the program to another is called **control structure** or **control statement.**

34. Write note on range() in loop

- The range() generates a list of values starting from start till stop-1.
- The syntax of range():

  range (start,stop,[step])

  start – refers to the initial value
  stop – refers to the final value
  step – refers to increment value, this is optional part.

35. What is function?

- Functions are named blocks of code that are designed to do specific job.
- Functions are nothing but a group of related statements that perform a specific task.

36. Write the different types of function.

1. User defined functions
2. Built in functions
3. Recursive functions
4. Lambda functions

37. What are the main advantages of function?

- It avoids repetition and makes high degree of code reusing.
- It provides better modularity for your application.

38. What is meant by scope of variable? Mention its types.

- Scope of variable refers to the part of the program, where it is accessible, i.e., area where you can refer (use) it.
- Types of scopes:
  - Local scope and Global scope.

39. Define global scope.

A variable, with global scope can be used anywhere in the program. It can be created by defining a variable outside the scope of any function/block.

40. What is base condition in recursive function?

The condition that is applied in any recursive function is known as base condition.

41. How to set the limit for recursive function? Give an example.

- sys.setrecursionlimit (limit_value) is used to set the limit for recursive function.
- Example:

```
import sys
sys.setrecursionlimit(3000)
```

42. What is String?

- String is a data type in python, which is used to handle array of characters.
- String is a sequence of Unicode characters that may be a combination of letters, numbers, or special symbols enclosed within single, double or even triple quotes.

43. Do you modify a string in Python?

- No, in python, strings are immutable, it means, once you define a string, it cannot be changed during execution.

44. How will you delete a string in Python?

- Python will not allow deleting a particular character in a string.

- Whereas the entire string can be removed using **del** command.

45. What will be the output of the following python code?

```
str1 = “School”
print(str1*3)
```

Output:

```
SchoolSchoolSchool
```

46. What is slicing?

Slice is a substring of a main string.

47. What is List in Python?

- A list in Python is known as a “sequence data type” like strings.
- It is an ordered collection of values enclosed within square brackets [ ].

48. How will you access the list elements in reverse order?

- A negative index can be used to access an element in reverse order.

49. What will be the value of x in following python code?

```
List1=[2,4,6[1,3,5]]
x=len(List1)
```

Answer: 4

50. Differentiate del with remove( ) function of List.

- The del statement is used to delete known elements whereas
- The remove( ) function is used to delete elements of a list if its index is unknown.

51. Write the syntax of creating a Tuple with n number of elements.

Tuple_Name = (E1, E2, E2 ……. En)

52. What is set in Python?

- A Set is a mutable and an unordered collection of elements without duplicates.

53. What is class?

- Class is the main building block in Python.
- Object is a collection of data and function that act on those data.
- Class is a template for the object.

54. What is instantiation?

- The process of creating object is called as “Class Instantiation”.

55. What is the output of the following program?

```
class Sample:
    __num=10
    def disp(self):
        print(self.__num)
S=Sample()
S.disp()
print(S.__num)
```

Output:

```
AttributeError: 'Sample' object has no
attribute '__num'
```

56. How will you create constructor in Python?

- In Python, there is a special function called ***“init”*** which act as a Constructor. It must begin and end with double underscore.
- This constructor function can be defined with or without arguments.
- General format of __init__ method (Constructor function)

```
def __init__(self, [args ……..]):
    <statements>
```

57. What is the purpose of Destructor?

- Destructor destroyed the objects were created during instantiation.
- Used to clean up any resources used by it.

58. Mention few examples of a database.

- Foxpro,
- Dbase,
- MS-Access,
- OpenOffice Base

59. List some examples of RDBMS.

- SQL server,
- Oracle,
- mysql,
- MariaDB,
- SQLite.

60. What is data consistency?

- Data Consistency means that data values are the same at all instances of a database

61. What is the difference between Hierarchical and Network data model?

Hierarchical data model	Network data model
In hierarchical model, a child record has only one parent node	In a Network model, a child may have many parent nodes.

62. What is normalization?

- Normalization reduces data redundancy and improves data integrity

63. Write a query that selects all students whose age is less than 18 in order wise.

Select * from Students where age < 19 order by name;

64. Differentiate Unique and Primary Key constraint.

Unique Constraint	Primary Key Constraint
This constraint ensures that no two rows have the same value in the specified columns.	This constraint declares a field as a Primary key which helps to uniquely identify a record.
The UNIQUE constraint can be applied only to fields that have been declared as NOT NULL.	The primary key does not allow NULL values, therefore a field declared as primary key must have the NOT NULL constraint.

65. Write the difference between table constraint and column constraint?

Column Constraint	Table Constraint
Column constraint apply only to individual column.	Table constraint apply to a group of one or more columns.

66. Which component of SQL lets insert values in tables and which lets to create a table?

- Create Table – command used to create tables in SQL
- Insert into – command used to insert values in a table
- **Example:**
  Create table Student (regno integer(3), sname varchar(20), mark integer(2));
  Insert into Student values (regno, sname, mark) values (121, 'Raj', 56);

67. What is the difference between SQL and MySQL?

- SQL is a language that helps to create and operate relational databases.
- MySQL is a database management system.

68. What is CSV File?

- A CSV file is a human readable text file where each line has a number of fields, separated by commas or some other delimiter.
- A CSV file is a text file, so it can be created and edited using any text editor.

69. Mention the two ways to read a CSV file using Python.

1. Use the csv module's reader function
2. Use the DictReader class.

70. Mention the default modes of the File.

- Open a file for reading (r) is the default mode.

71. What is use of next() function?

- The next( ) function returns the next item from iterator. It can also be used to skip a row of the csv file.

72. How will you sort more than one column from a csv file? Give an example statement.

- The sorted( ) method sorts the elements of a given item in a specific order – Ascending or Descending.
- Example:

sortedlist = sorted(data, key=operator.itemgetter (Col_number),reverse=True)

73. What is the theoretical difference between Scripting language and other programming language?

Programming language	Scripting language
Requires compilation step	Do not require the compilation step
Requires Compiler	Requires interpreter

74. Differentiate compiler and interpreter.

Compiler	Interpreter
Translate instructions into effect machine code.	Directly executes the instructions in the source programming language.

75. Write the expansion of (i) SWIG (ii) MinGW

(i) SWIG - Simplified Wrapper Interface Generator- Both C and C++.
(ii) MinGW - Minimalist GNU for Windows.

76. What is the use of modules?

- Using the module name we can access the functions defined inside the module.
- The dot (.) operator is used to access the functions.

77. What is the use of CD command? Give an example.

- CD command is used to change current directory in command prompt.

78. Mention the users who uses the Database.

- Users of database can be human users, other programs or applications.

79. Which method is used to connect a database? Give an example.

- The connect( ) method is used to connect a database.
- Example:

  connection = sqlite3.connect ("Academy.db")

80. What is the advantage of declaring a column as "INTEGER PRIMARY KEY"

If a column of a table is declared to be an INTEGER PRIMARY KEY, then whenever a NULL will be used as an input for this column, the NULL will be automatically converted into an integer which will one larger than the highest value so far used in that column.

81. Write the command to populate record in a table. Give an example.

- To populate (add record) the table "INSERT" command is passed to SQLite.
- Example:
  sql_command = """INSERT INTO Student (Rollno, Sname, Grade, gender, Average, birth_date)
  VALUES (NULL, "Akshay", "B", "M","87.8", "2001-12-12");""" cursor.execute(sql_ command)

82. Which method is used to fetch all rows from the database table?

- The fetchall() method is used to fetch all rows from the database table.

83. Define: Data Visualization.

- Data Visualization is the graphical representation of information and data.

84. List the general types of data visualization.

- Charts
- Tables
- Graphs
- Maps
- Infographics
- Dashboards

85. List the types of Visualizations in Matplotlib.

- Line plot
- Scatter plot
- Histogram
- Box plot
- Bar chart and
- Pie chart

86. How will you install Matplotlib?

- Install matplotlib using pip.
- Pip is a management software for installing python packages.

87. Write the difference between the following functions:
plt.plot([1,2,3,4]),
plt. plot([1,2,3,4], [1,4,9,16]).

plt.plot([1,2,3,4])	plt. plot([1,2,3,4], [1,4,9,16])
Hover the graph and see the coordinates in the bottom right.	This .plot takes many parameters, but the first two here are 'x' and 'y' coordinates. This means, 4 co-ordinates according to these lists: (1,1), (2,4), (3,9) and (4,16).

*****

PART - III
(3 MARKS)

ANSWER THE FOLLOWING QUESTIONS:

1. Mention the characteristics of Interface.

- The class template specifies the interfaces to enable an object to be created and operated properly.
- An object's attributes and behavior is controlled by sending functions to the object.

2. Why strlen is called pure function?

- Pure functions are functions which will give exact result when the same arguments are passed.
- The strlen is a pure function because the function takes one variable as a parameter, and accesses it to find its length.
- This function reads external memory but does not change it, and the value returned derives from the external memory accessed.

3. What is the side effect of impure function? Give example.

- A function has side effects when it has observable interaction with the outside world.
- Example:

```
let y: = 0
(int) inc (int) x
y: = y + x;
return (y)
```

4. Differentiate pure and impure function.

Pure Function	Impure Function
The return value of the pure functions solely depends on its arguments passed.	The return value of the impure functions does not solely depend on its arguments passed.
if you call the pure functions with the same set of arguments, you will always get the same return values.	if you call the impure functions with the same set of arguments, you might get the different return values
They do not have any side effects.	They have side effects
They do not modify the arguments which are passed to them	They may modify the arguments which are passed to them

5. What happens if you modify a variable outside the function? Give an example.

- One of the most popular groups of side effects is modifying the variable outside of function.
- For example

let y: = 0
(int) inc (int) x
y: = y + x;
return (y)

- In the above example the value of y get changed inside the function definition due to which the result will change each time.
- The side effect of the inc( ) function is it is changing the data of the external visible variable ***'y'***. As we can see some side

effects are quite easy to spot and some of them may tricky.

6. Differentiate Concrete data type and abstract data type.

Concrete data type	Abstract data type
A concrete data type is a data type whose representation is known.	An abstract data type the representation of a data type is unknown.

7. Which strategy is used for program designing? Define that Strategy.

- The 'wishful thinking' strategy is used for designing programs.
- Wishful Thinking is the formation of beliefs and making decisions according to what might be pleasing to imagine instead of by appealing to reality.

8. Identify which of the following are constructors and selectors?

(a) N1=number() (b) accetnum(n1)
(c) displaynum(n1) (d) eval(a/b)
(e) x,y= makeslope(m), makeslope(n)
(f) display()

Answer:

(a) N1=number()	Constructor
(b) accetnum(n1)	Selector
(c) displaynum(n1)	Selector
(d) eval(a/b)	Selector
(e) x,y= makeslope	Constructor
(f) display()	Constructor

9. What are the different ways to access the elements of a list. Give example.

- The elements of a list can be accessed in two ways.
- The first way is via familiar method of multiple assignment, which unpacks a list into its elements and binds each element to a different name.
- Example:

```
lst := [10, 20]
x, y := lst
```

- A second method for accessing the elements in a list is by the element selection operator, also expressed using square brackets.
- Example:

```
lst[0]
10
lst[1]
20
```

10. Identify Which of the following are List, Tuple and class?

(a) arr [1, 2, 34]
(b) arr (1, 2, 34)
(c) student [rno, name, mark]
(d) day= ('sun', 'mon', 'tue', 'wed')
(e) x= [2, 5, 6.5, [5, 6], 8.2]
(f) employee [eno, ename, esal, eaddress]

Answer:

(a) arr [1, 2, 34]	List
(b) arr (1, 2, 34)	Tuple
(c) student [rno, name, mark]	List
(d) day= ('sun', 'mon', 'tue', 'wed')	Tuple
(e) x= [2, 5, 6.5, [5, 6], 8.2]	Class
(f) employee [eno, ename, esal, eaddress]	List

11. Define Local scope with an example.

- Local scope refers to variables defined in current function.
- Always, a function will first look up for a variable name in its local scope.
- Example:

```
1. Disp():
2. a:=7
3. print a
4. Disp()
```

12. Define Global scope with an example.

- A variable which is declared outside of all the functions in a program is known as global variable.
- This means, global variable can be accessed inside or outside of all the functions in a program.
- Example

```
1. a:=10
2. Disp():
3.      a:=7
4.      print a
5. Disp()
6. print a
```

13. Define Enclosed scope with an example.

- A variable which is declared inside a function which contains another function definition with in it, the inner function can also access the variable of the outer function.
- When a compiler or interpreter search for a variable in a program, it first search Local, and then search Enclosing scopes.
- Example

```
Disp():
a:=10
Disp1():
    print a
    Disp1()
print a
Disp()
```

14. Why access control is required?

- Access control is a security technique that regulates who or what can view or use resources in a computing environment.
- It is a fundamental concept in security that minimizes risk to the object. In other words access control is a selective restriction of access to data.

15. Identify the scope of the variables in the following pseudo code and write its output

```
color:= Red
mycolor():
    b:=Blue
    myfavcolor():
        g:=Green
        printcolor, b, g
    myfavcolor()
    printcolor, b
mycolor()
print color
```

Output:

```
Blue Green
Blue
Blue Green
Blue
Red
```

16. List the characteristics of an algorithm.

- Input
- Output
- Finiteness
- Definiteness
- Effectiveness
- Correctness
- Simplicity
- Unambiguous
- Feasibility
- Portable
- Independent

17. Discuss about Algorithmic complexity and its types.

- The complexity of an algorithm f (n) gives the running time and/or the storage space required by the algorithm in terms of n as the size of input data.
- **Time Complexity:**
  The Time complexity of an algorithm is given by the number of steps taken by the algorithm to complete the process.
- **Space Complexity:**
  Space complexity of an algorithm is the amount of memory required to run to its completion.

18. What are the factors that influence time and space complexity.

- **Time Factor** -Time is measured by counting the number of key operations like comparisons in the sorting algorithm.
- **Space Factor** - Space is measured by the maximum memory space required by the algorithm.

19. Write a note on Asymptotic notation.

Asymptotic Notations are languages that uses meaningful statements about time and space complexity.

- **Big O**
  Big O is often used to describe the worst-case of an algorithm.
- **Big Ω**
  Big Omega is the reverse Big O, if Bi O is used to describe the upper bound (worst - case) of a asymptotic function, Big Omega is used to describe the lower bound (best-case).

- **Big Θ**

  When an algorithm has a complexity with lower bound = upper bound, say that an algorithm has a complexity O (n log n) and Ω (n log n), it's actually has the complexity Θ (n log n), which means the running time of that algorithm always falls in n log n in the best-case and worst-case.

20. What do you understand by Dynamic programming?

- Dynamic programming is an algorithmic design method that can be used when the solution to a problem can be viewed as the result of a sequence of decisions.
- Dynamic programming approach is similar to divide and conquer.
- The given problem is divided into smaller and yet smaller possible sub-problems.

Dynamic programming is used whenever problems can be divided into similar sub-problems. So that their results can be re-used to complete the process.

21. Write short notes on Arithmetic operator with examples.

An arithmetic operator is a mathematical operator that takes two operands and performs a calculation on them. They are used for simple arithmetic.

Operator - Operation	Examples	Result
Assume a=100 and b=10. Evaluate the following expressions		
+ (Addition)	>>> a + b	110
- (Subtraction)	>>>a – b	90
* (Multiplication)	>>> a*b	1000
/ (Division)	>>> a / b	10.0
% (Modulus)	>>> a % 30	10
** (Exponent)	>>> a ** 2	10000
// (Floor Division)	>>> a//30 (Integer Division)	3

Example:

```
a=100
b=10
print ("The Sum = ",a+b)
print ("The Difference = ",a-b)
print ("The Product = ",a*b)
print ("The Quotient = ",a/b)
print ("The Remainder = ",a%30)
print ("The Exponent = ",a**2)
print ("The Floor Division =",a//30)
```

Output:

```
The Sum = 110
The Difference = 90
The Product = 1000
The Quotient = 10.0
The Remainder = 10
The Exponent = 10000
The Floor Division = 3
```

22. What are the assignment operators that can be used in Python?

- In Python, = is a simple assignment operator to assign values to variable.
- Let a = 5 and b = 10 assigns the value 5 to a and 10 to b these two-assignment statement can also be given as a, b=5, 10 that assigns the value 5 and 10 on the right to the variables a and b respectively.
- There are various compound operators in Python like +=, -=, *=, /=, %=, **= and //= are also available.

Operator	Description	Example (Assume: x=10)
=	Assigns right side operands to left variable	>>> x=10 >>> b="Computer"
+=	Added and assign back the result to left operand	>>> x+=20 # x=x+20
-=	Subtracted and assign back the result to left operand	>>> x-=5 # x=x-5

***=**	Multiplied and assign back the result to left operand	>>> x*=5 # x=x*5
/=	Divided and assign back the result to left operand	>>> x/=2 # x=x/2
%=	Taken modulus(Remainder) using two operands and assign the result to left operand	>>> x%=3 # x=x%3
****=**	Performed exponential (power) calculation on operators and assign value to the left operand	>>> x**=2 # x=x**2
//=	Performed floor division on operators and assign value to the left operand	>>> x//=3

23. Explain Ternary operator with examples.

- Ternary operator is also known as conditional operator that evaluates something based on a condition being true or false.
- It simply allows testing a condition in a single line replacing the multiline if-else making the code compact.

The Syntax:

Variable Name = [on_true] if [Test expression] else [on_false]

Example:

```
min= 50 if 49 < 50 else 70
min= 50 if 49 > 50 else 70
```

Example Program:

```
a, b = 30, 20
min = a if a < b else b
print ("The Minimum of A and B is ",min)
```

Output:

```
The Minimum of A and B is 20
```

24. Write short notes on Escape sequences with examples.

- In Python strings, the backslash "\" is a special character, also called the "escape" character.
- It is used in representing certain whitespace characters:
  "\t" is a tab, "\n" is a newline, and "\r" is a carriage return.
- For example to print the message "It's raining", the Python command is

```
>>> print ("It\'s raining")
It's raining
```

Escape sequence character		**Example**	**Output**
\	Backslash	>>> print("\\test")	\test
\’	Single-quote	>>> print("Doesn\'t")	Doesn't
\”	Double-quote	>>> print("\"Python\"")	"Python"
\n	New line	print("Python","\n","Lang..")	Python Lang..
\t	Tab	print("Python","\t","Lang..")	Python Lang..

25. What are string literals? Explain.

- In Python a string literal is a sequence of characters surrounded by quotes.
- Python supports single, double and triple quotes for a string.
- A character literal is a single character surrounded by single or double quotes.
- The value with triple-quote ''' ''' is used to give multiline string literal.

Example Program:

```
strings = "This is Python"
char = "C"
multiline_str = '''This is a multiline string with
more than one line code.'''
print (strings)
print (char)
print (multiline_str)
```

Output:

```
This is Python
C
This is a multiline string with more than one
line code.
```

26. Write a program to display

A
A B
A B C
A B C D
A B C D E

Program:

```
for i in range (65, 70):
        for j in range (65, i+1):
                print(chr(j), end=' ')
        print("")
```

Output:

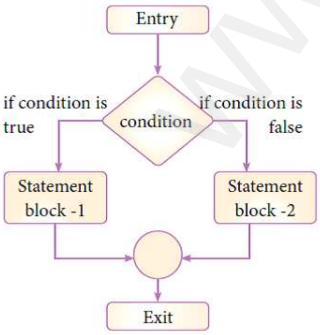
```
A
A B
A B C
A B C D
A B C D E
```

27. Write note on if..else structure.

- The if .. else statement provides control to check the true block as well as the false block.
- Syntax:

```
if <condition>:
        statements-block 1
else:
        statements-block 2
```

- Flow chart:



- if..else statement thus provides two possibilities and the condition determines which BLOCK is to be executed.

28. Using if..else..elif statement write a suitable program to display largest of 3 numbers.

Program:

```
num1=int(input("Enter number 1: "))
num2=int(input("Enter number 2: "))
num3=int(input("Enter number 3: "))
if (num1 > num2):
        large=num1
elif (num2 > num3):
        large=num2
else:
        large=num3
print("The Largest number is: ",large)
```

Output:

```
Enter number 1: 78
Enter number 2: 90
Enter number 3: 34
The Largest number is: 90
```

29. Write the syntax of while loop.

```
while <condition>:
        statements block 1
[else:
        statements block2]
```

30. List the differences between break and continue statements.

Break	Continue
Itis used terminates the loop containing it. Control of the program flows to the statement immediately after the body of the loop	It is used to skip the remaining part of a loop and start with next iteration

31. Write the rules of local variable.

1. A variable with local scope can be accessed only within the function/block that it is created in.

2. When a variable is created inside the function/block, the variable becomes local to it.
3. A local variable only exists while the function is executing.
4. The format arguments are also local to function.

32. Write the basic rules for global keyword in python.

1. When we define a variable outside a function, it's global by default. You don't have to use global keyword.
2. We use global keyword to read and write a global variable inside a function.
3. Use of global keyword outside a function has no effect

33. What happens when we modify global variable inside the function?

- Without using the global keyword we cannot modify the global variable inside the function but we can only access the global variable.

34. Differentiate ceil( ) and floor( ) function?

ceil( )	**floor( )**
Returns the smallest integer greater than or equal to the given number	Returns the largest integer less than or equal to the given value.
General format: math.ceil(x)	General format: math.floor(x)

Example:
import math
x=26.7
print(math.ceil(x))
	Example:
	import math
	x=26.7
	print(math.floor(x))

35. Write a Python code to check whether a given year is leap year or not.

```
def leap(year):
    if((year%4==0 and year%100!=0) or
      (year%400==0)):
            print(year, " is a Leap year")
    else:
            print(year, " is not a Leap year")

y=int(input("Enter a year : "))
leap(y)
```

Output:

```
        Enter a year : 2001
        2001  is not a Leap year
```

Output:

```
        Enter a year : 2008
        2008  is a Leap year
```

36. What is composition in functions?

The value returned by a function may be used as an argument for another function in a nested manner. This is called **composition**.

37. How recursive function works?

1) Recursive function is called by some external code.
2) If the base condition is met then the program gives meaningful output and exits.
3) Otherwise, function does some required processing and then calls itself to continue recursion.

38. What are the points to be noted while defining a function?

- Function blocks begin with the keyword **"def"** followed by function name and parenthesis ().
- Any input parameters or arguments should be placed within these parentheses when define a function.
- The code block always comes after a colon (:) and is indented.
- The statement **"return [expression]"** exits a function, optionally passing back an expression to the caller.
- A **"return"** with no arguments is the same as return None.

39. Write a Python program to display the given pattern

```
C O M P U T E R
C O M P U T E
C O M P U T
C O M P U
C O M P
C O M
C O
C
```

Coding:

```
        str1="COMPUTER"
        index=len(str1)
        for i in str1:
                print(str1[0:index])
        index-=1
```

40. Write a short about the followings with suitable example:

(a) capitalize( )

(b) swapcase( )

(a) capitalize( )

- Used to capitalize the first character of the string.

Example:

```
>>> city="chennai"
>>> print(city.capitalize())
        Chennai
```

(b) swapcase( )

- This function will change case of every character to its opposite case vice-versa.

Example:

```
>>> str1="tAmiL NaDu"
>>> print(str1.swapcase())
        TaMIl nAdU
```

41. What will be the output of the given python program?

```
str1 = "welcome"
str2 = "to school"
str3=str1[:2]+str2[len(str2)-2:]
print(str3)
```

Output:

```
weol
```

42. What is the use of format( )? Give an example.

- The format( ) function used with strings is very versatile and powerful function used for formatting strings.
- The curly braces { } are used as placeholders or replacement fields which get replaced along with format( ) function.
- Example:

```
num1=int (input("Number 1: "))
num2=int (input("Number 2: "))
print ("The sum of { } and { } is {
}".format(num1, num2,(num1+num2)))
```

Output:

```
        Number 1: 34
        Number 2: 54
        The sum of 34 and 54 is 88
```

43. Write a note about count( ) function in python.

- Returns the number of substrings occurs within the given range.
- Remember that substring may be a single character.
- Range (beg and end) arguments are optional. If it is not given, python searched in whole string. Search is case sensitive.
- General format of count( ):

  count(str, beg, end)
- Example:

```
>>> str1="Raja Raja Chozhan"
>>> print(str1.count('Raja'))
2
>>> print(str1.count('r'))
0
>>> print(str1.count('R'))
2
```

44. What are the advantages of Tuples over a list?

1. The elements of a list are changeable (mutable) whereas the elements of a tuple are unchangeable (immutable), this is the key difference between tuples and list.
2. The elements of a list are enclosed within square brackets. But, the elements of a tuple are enclosed by paranthesis.
3. Iterating tuples is faster than list.

45. Write a shot note about sort( ).

- The sort( ) is used to sorts the elements in a list.
- The sorting process affects the original list.
- The general format:

```
List.sort(reverse=True|False,
key=myFunc)
```

- Both, reverse and key arguments are optional
  - If reverse is set to True, the list will be sorted in descending order
  - Ascending is default.
- Example:

```
MyList=['B','G','Z','A','V']
MyList.sort()
print(MyList)
```

- Output:

```
['A', 'B', 'G', 'V', 'Z']
```

46. What will be the output of the following code?

```
list = [2**x for x in range(5)]
print(list)
```

Output:

```
[1, 2, 4, 8, 16]
```

47. Explain the difference between del and clear( ) in dictionary with an example.

- In Python dictionary, del keyword is used to delete a particular element.
- The clear( ) function is used to delete all the elements in a dictionary.
- To remove the dictionary, you can use del keyword with dictionary name.
- Example:

```
Dict = {'Roll' : 12001, 'SName' :
'Meena', 'Mark1' : 98, 'Marl2' : 86}
del Dict['Mark1']
Dict.clear()
del Dict
```

48. List out the set operations supported by python.

1. Union: It includes all elements from two or more sets
2. Intersection: It includes the common elements in two sets
3. Difference: It includes all elements that are in fi rst set (say set A) but not in the second set (say set B)
4. **Symmetric difference:** It includes all the elements that are in two sets (say sets A and B) but not the one that are common to two sets.

48. What are the difference between List and Dictionary?

(1) List is an ordered set of elements. But, a dictionary is a data structure that is used for matching one element (Key) with another (Value).

(2) The index values can be used to access a particular element. But, in dictionary key represents index. Remember that, key may be a number of a string.

(3) Lists are used to look up a value whereas a dictionary is used to take one value and look up another value.

50. What are class members? How do you define it?

- Variables defined inside a class are called as ***"Class Variable"*** and functions are called as ***"Methods"***.
- Class variable and methods are together known as members of the class.
- The class members should be accessed through objects or instance of class.

51. Write a class with two private class variables and print the sum using a method.

```
class Add:
        def __init__(self, num1, num2):
                print("Constructor...")
                self.__num1=num1
                self.__num2=num2

        def sum(self):
                s=self.__num1 + self.__num2
                print("The sum=",s)
Res=Add(32,65)
Res.sum()
```

Output:

```
        Constructor...
        The sum= 97
```

52. Find the error in the following program to get the given output?

```
class Fruits:
    def __init__(self, f1, f2):
            self.f1=f1
            self.f2=f2

        def display(self):
            print("Fruit 1 = %s, Fruit 2 = %s"
    %(self.f1, self.f2))

    F = Fruits ('Apple', 'Mango')
    del F.display
    F.display()
```

Output:

```
    Fruit 1 = Apple,   Fruit 2 = Mango
```

Error:

del F.display

This statement deletes the object F, Hence the Python shows attribute error.

Correct Statement:

F.display

53. What is the output of the following program?

```
    class Greeting:
        def __init__(self, name):
            self.__name = name

        def display(self):
            print("Good Morning ", self.__name)

    obj=Greeting('Bindu Madhavan')
    obj.display()
```

Output:

```
    Good Morning  Bindu Madhavan
```

54. How do define constructor and destructor in Python?

- In Python, the constructors should be defined using __init__ special function.
- Destructors defined using __del__ special function.

55. What is the difference between Select and Project command?

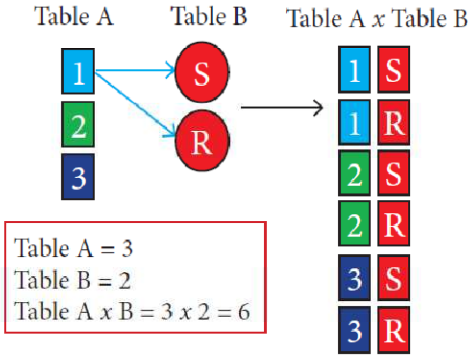
Select	Project
Symbol: σ	Symbol: π
The SELECT operation is used for selecting a subset with tuples according to a given condition.	The projection eliminates all attributes of the input relation but those mentioned in the projection list.

56. What is the role of DBA?

- Database Administrator or DBA is the one who manages the complete database management system.
- DBA takes care of the security of the DBMS, managing the license keys, managing user accounts and access etc.

57. Explain Cartesian Product with a suitable example.

- Cross product is a way of combining two relations. The resulting relation contains, both relations being combined.
- A x B means A times B, where the relation A and B have different attributes.
- This type of operation is helpful to merge columns from two relations.



58. Explain Object Model with example.

- Object model stores the data in the form of objects, attributes and methods, classes and Inheritance.
- This model handles more complex applications, such as Geographic information System (GIS), scientific experiments, engineering design and manufacturing.

- It is used in file Management System.
- It represents real world objects, attributes and behaviors.
- It provides a clear modular structure.
- It is easy to maintain and modify the existing code.
- An example of the Object model is Shape, Circle, Rectangle and Triangle are all objects in this model.
    - Circle has the attribute radius.
    - Rectangle has the attributes length and breadth.
    - Triangle has the attributes base and height.
    - The objects Circle, Rectangle and Triangle inherit from the object Shape.

59. Write a note on different types of DBMS users.

- **Database Administrators:**
  Database Administrator or DBA is the one who manages the complete database management system. DBA takes care of the security of the DBMS, managing the license keys, managing user accounts and access etc.
- **Application Programmers or Software Developers:**
  This user group is involved in developing and designing the parts of DBMS.
- **End User:**
  All modern applications, web or mobile, store user data. Applications are programmed in such a way that they collect user data and store the data on DBMS systems running on their server. End users are the one who store, retrieve, update and delete data.
- **Database designers:**
  Database designers are responsible for identifying the data to be stored in the database for choosing appropriate structures to represent and store the data.

60. What is a constraint? Write short note on Primary key constraint.

Constraint:

- Constraint is a condition applicable on a field or set of fields.

Primary Constraint:

- The constraint declares a field as a Primary key which helps to uniquely identify a record.
- The primary key does not allow NULL values and therefore a field declared as primary key must have the NOT NULL constraint.

61. Write a SQL statement to modify the student table structure by adding a new field.

ALTER TABLE student ADD (field1 integer(3), field2 integer(3));

62. Write any three DDL commands. / Write a short note on (i) Alter (ii) Truncate (iii) Drop.

(i) Alter:

- The alter command is used to alter the table structure like adding a column, renaming the existing column, change the data type of any column or size of the column or delete the column from the table.
- Syntax:
  ALTER TABLE <table-name> ADD <column-name><data type><size>;

(ii) Truncate:

- The truncate command is used to delete all the rows from the table, the structure remains and the space is freed from the table.
- Syntax:
  TRUNCATE TABLE table-name;

(iii) Drop:

- The drop command is used to remove a table from the database.
- If you drop a table, all the rows in the table is deleted and the table structure is removed from the database.
- When drop a table, it must be empty.
- Syntax:
  DROP TABLE table-name;

63. Write the use of Save point command with an example.

- The SAVEPOINT command is used to temporarily save a transaction so that you can rollback to the point whenever required.
- The different states of our table can be saved at anytime using different names and the rollback to that state can be done using the **ROLLBACK** command.
- Syntax:
  SAVEPOINT savepoint_name;
- Example:
  UPDATE Student SET Name = 'Mini' WHERE Admno=105;
  SAVEPOINT A;

64. Write a SQL statement using DISTINCT keyword.

SELECT DISTINCT Place FROM Student;

65. Write a note on open( ) function of python. What is the difference between the two methods?

- Python has a built-in function open() to open a file.
- This function returns a file object, also called a handle, as it is used to read or modify the file accordingly.
- For Example
  f = open("sample.txt")
  f = open('c:\\pyprg\\ch13sample5.csv')

66. Write a Python program to modify an existing file.

```
import csv
row = ['3', 'Meena', 'Bangalore']
with open('student.csv', 'r') as readFile:
    reader = csv.reader(readFile)
lines = list(reader)
lines[3] = row
with open('student.csv', 'w') as writeFile:
    writer = csv.writer(writeFile)
writer.writerows(lines)
readFile.close()
writeFile.close()
```

67. Write a Python program to read a CSV file with default delimiter comma (,).

```
import csv
info = [['SNO', 'Person', 'DOB'],
['1', 'Madhu', '18/12/2001'],
['2', 'Sowmya','19/2/1998'],
['3', 'Sangeetha','20/3/1999'],
['4', 'Eshwar', '21/4/2000'],
['5', 'Anand', '22/5/2001']]
csv.register_dialect('myDialect',delimiter = '|')
with open('c:\pyprg\ch13\dob.csv', 'w') as f:
    writer = csv.writer(f, dialect='myDialect')
for row in info:
    writer.writerow(row)
f.close()
```

68. What is the difference between the write mode and append mode?

Write mode (w)	Append mode (a)
Open a file for writing.	Open for appending at the end of the file without truncating it.
Creates a new file if it does not exist or truncates the file if it exists	Creates a new file if it does not exist

69. What is the difference between reader() and DictReader() function?

reader( )	DictReader( )
The reader function is designed to take each line of the file and make a list of all columns.	DictReader works by reading the first line of the CSV and using each comma separated value in this line as a dictionary key.

70. Differentiate PYTHON and C++

Python	C++
Python is typically an "interpreted" language	C++ is typically a "compiled" language
Python is a dynamic-typed language	C++ is compiled statically typed language
Data type is not required while declaring variable	Data type is required while declaring variable
It can act both as scripting and general purpose language	It is a general purpose language

71. What are the applications of scripting language?

- To automate certain tasks in a program
- Extracting information from a data set
- Less code intensive as compared to traditional programming language
- Can bring new functions to applications and glue complex systems together

72. What is MinGW? What is its use?

- MinGW refers to a set of runtime header files, used in compiling and linking the code of C, C++ and FORTRAN to be run on Windows Operating System.
- MinGW allows to compile and execute C++ program dynamically through Python program using g++.

73. Identify the module, operator, definition name for the following

welcome.display( )

Module	: welcome
Operator	: dot(.)
Definition name	: display( )

74. What is sys.argv? What does it contain?

- sys.argv is the list of command-line arguments passed to the Python program.
- Argv contains all the items that come along via the command-line input, it's basically an array holding the command-line arguments of the program.

75. What is SQLite? What is it advantage?

- SQLite is a simple relational database system, which saves its data in regular data files or even in the internal memory of the computer.
- **Advantages:**

1. It is designed to be embedded in applications, instead of using a separate database server program such as MySQLor Oracle.
2. SQLite is fast, rigorously tested, and flexible, making it easier to work. Python has a native library for SQLite.

76. Mention the difference between fetchone() and fetchmany()

fetchone( )	fetchmany( )
The fetchone () method returns the next row of a query result set or None in case there is no row left.	fetchmany() method that returns the next number of rows (n) of the result set

77. What is the use of Where Clause? Give a python statement Using the where clause.

- The WHERE clause is used to extract only those records that fulfil a specified condition.
- Example:

```
import sqlite3
connection = sqlite3.connect("Academy.db")
cursor = connection.cursor()
cursor.execute("SELECT DISTINCT (Grade) FROM student where gender='M'")
result = cursor.fetchall()
print(*result,sep="\n")
```

78. Read the following details. Based on that write a python script to display department wise records
database name: organization.db
Table name: Employee
Columns in the table: Eno, EmpName, Esal, Dept

Answer:

```
import sqlite3
connection = sqlite3.connect("organization.db")
cursor = connection.cursor()
cursor.execute("SELECT Eno, EmpName, Esal, Dept FROM Employee Group BY Dept")
result = cursor.fetchall()
print(*result,sep="\n")
```

79. Read the following details. Based on that write a python script to display records in descending order of Eno
database name: organization.db
Table name: Employee
Columns in the table: Eno, EmpName, Esal, Dept

Answer:

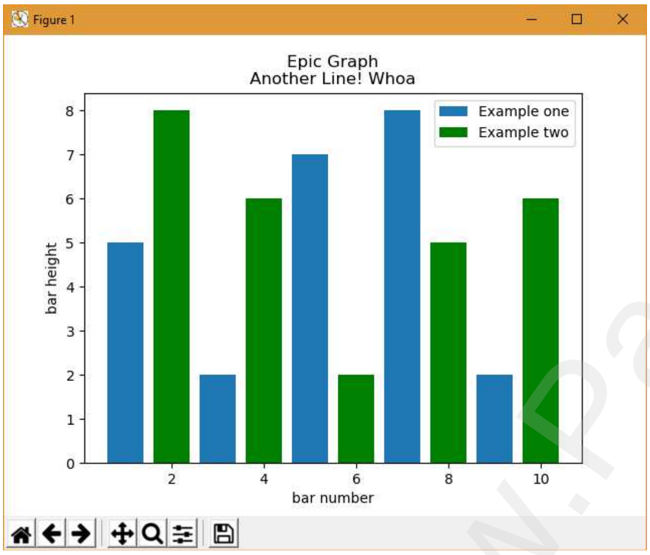
```
import sqlite3

connection = sqlite3.connect("organisation.db")

cursor = connection.cursor()
```

```
cursor.execute("SELECT Eno, EmpName, Esal, Dept FROM employee Order BY Eno")
result = cursor.fetchall()
print(*result,sep="\n")
```

80. Draw the output for the following data visualization plot.

```
import matplotlib.pyplot as plt
plt.bar([1,3,5,7,9],[5,2,7,8,2], label="Example one")
plt.bar([2,4,6,8,10],[8,6,2,5,6], label="Example two",
        color='g')
plt.legend()
plt.xlabel('bar number')
plt.ylabel('bar height')
plt.title('Epic Graph\nAnother Line! Whoa')
plt.show()
```

Solution:



81. Write any three uses of data visualization.

1. Data Visualization help users to analyze and interpret the data easily.
2. It makes complex data understandable and usable.
3. Various Charts in Data Visualization helps to show relationship in the data for one or more variables.

82. Write the coding for the following:

a. To check if PIP is Installed in your PC.

- pip --version

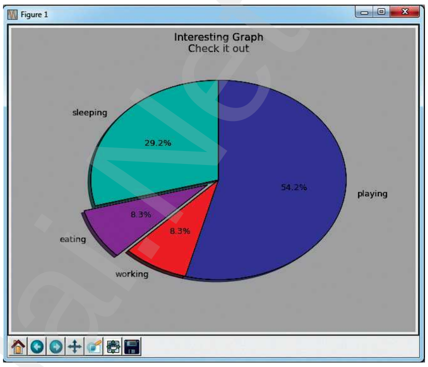
b. To Check the version of PIP installed in your PC.

- Python –m pip install –U pip

c. To list the packages in matplotlib.

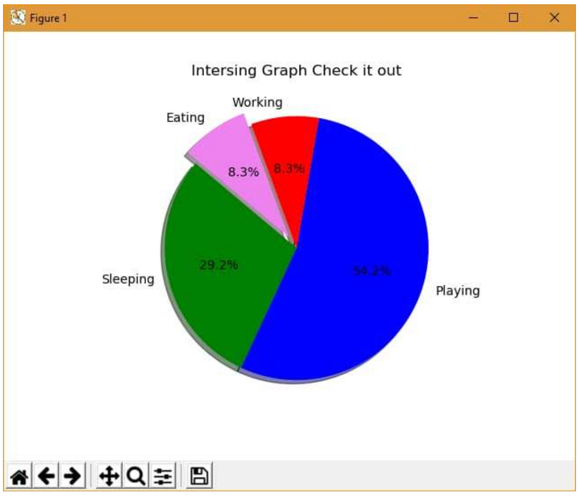
- pip list

83. Write the plot for the following pie chart output.



Solution:

```
import matplotlib.pyplot as plt
labels = ["Sleeping", "Playing", "Working", "Eating"]
sizes = [292, 542, 83, 83]
colors = ['green', 'blue', 'red', 'violet']
explode=[0,0,0,0.1]
plt.pie (sizes, labels = labels, explode=explode,
colors=colors, autopct = '%1.1f%%', shadow=True,
startangle=140)
plt.axes().set_aspect ("equal")
plt.title ('Intersing Graph Check it out')
plt.show( )
```



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PART - IV

(5 MARKS)

ANSWER THE FOLLOWING QUESTIONS:

1. What are called Parameters and write a note on

(i) Parameter without Type

(ii) Parameter with Type

Parameters are the variables in a function definition and arguments are the values which are passed to a function definition.

(i) Parameter without Type

- Example:

```
(requires: b>=0 )
(returns: a to the power of b)
let rec pow a b:=
if b=0 then 1
else a * pow a (b-1)
```

- In the above function definition variable *'b'* is the parameter and the value which is passed to the variable *'b'* is the argument.
- The precondition *(requires)* and post condition *(returns)* of the function is given.
- Note we have not mentioned any types: *(data types)*. Some language compiler solves this type *(data type)* inference problem algorithmically, but some require the type to be mentioned.

(ii) Parameter with Type

- Example:

```
(requires: b> 0 )
(returns: a to the power of b )
let rec pow (a: int) (b: int) : int :=
if b=0 then 1
else a * pow b (a-1)
```

- When we write the type annotations for ***'a'*** and ***'b'*** the parentheses are mandatory.
- Generally we can leave out these annotations, because it's simpler to let the compiler infer them.

2. Explain Pure and impure functions with an example.

Pure functions:

- Pure functions are functions which will give exact result when the same arguments are passed.
- A function can be a pure function provided it should not have any external variable which will alter the behavior of that variable.
- Example:

```
let square x
return: x * x
```

- Advantages of pure function:

  If a function is pure, then if it is called several times with the same arguments, the compiler only needs to actually call the function once.

- The strlen is a pure function because the function takes one variable as a parameter, and accesses it to find its length. This function reads external memory but does not change it, and the value returned derives from the external memory accessed.

Impure functions:

- The variables used inside the function may cause side effects though the functions which are not passed with any arguments.
- In such cases the function is called impure function.
- When a function depends on variables or functions outside of its definition block, you can never be sure that the function will behave the same every time it's called.
- Example:

```
let Random number
let a := random()
if a > 10 then
return: a
else
return: 10
```

3. What is a List? Why List can be called as Pairs? Explain with suitable example

List:

- List is constructed by placing expressions within square brackets separated by commas.
- List can store multiple values. Each value can be of any type and can even be another list.

Pairs:

- Any way of bundling two values together into one can be considered as a pair. Lists are a common method to do so.
- Therefore List can be called as Pairs.

Example:

```
rational(n, d):
return [n, d]
numer(x):
return x[0]
denom(x):
return x[1]
```

4. Explain the types of scopes for variable or LEGB rule with example.

(i) Local scope:

- Local scope refers to variables defined in current function.
- Always, a function will first look up for a variable name in its local scope.
- Example:

```
1. Disp():
2.      a:=7
3.      print a
4. Disp()
```

(ii) Global scope:

- A variable which is declared outside of all the functions in a program is known as global variable.
- This means, global variable can be accessed inside or outside of all the functions in a program.
- Example

```
1. a:=10
2. Disp():
3.      a:=7
4.      print a
5. Disp()
6. print a
```

(iii) Enclosed scope:

- A variable which is declared inside a function which contains another function definition with in it, the inner function can also access the variable of the outer function.
- When a compiler or interpreter search for a variable in a program, it first search Local, and then search Enclosing scopes.
- Example

```
1. Disp():
2. a:=10
3. Disp1():
4.      print a
5.      Disp1()
6. print a
7. Disp()
```

(iv) built-in scope:

- The built-in scope has all the names that are pre-loaded into the program scope when we start the compiler or interpreter.
- Any variable or module which is defined in the library functions of a programming language has Built-in or module scope.
- They are loaded as soon as the library files are imported to the program.

6. Write any Five Characteristics of Modules.

1. Modules contain instructions, processing logic, and data.
2. Modules can be separately compiled and stored in a library.
3. Modules can be included in a program.
4. Module segments can be used by invoking a name and some parameters.
5. Module segments can be used by other modules.

7. Write any five benefits in using modular programming.

1. Less code to be written.
2. A single procedure can be developed for reuse, eliminating the need to retype the code many times.
3. Programs can be designed more easily because a small team deals with only a small part of the entire code.
4. Modular programming allows many programmers to collaborate on the same application.
5. The code is stored across multiple files.

6. Code is short, simple and easy to understand.
7. Errors can easily be identified, as they are localized to a subroutine or function.
8. The same code can be used in many applications.
9. The scoping of variables can easily be controlled.

8. Discuss about Linear search algorithm.

- Linear search also called sequential search is a sequential method for finding a particular value in a list.
- This method checks the search element with each element in sequence until the desired element is found or the list is exhausted.
- In this searching algorithm, list need not be ordered.
- **Pseudo code:**

```
1. Traverse the array using for loop
2. In every iteration, compare the target search key value with the current value of the list.
     • If the values match, display the current index and value of the array
     • If the values do not match, move on to the next array element.
3. If no match is found, display the search element not found.
```

9. What is Binary search? Discuss with example.

- Binary search also called half-interval search algorithm. It finds the position of a search element within a sorted array.
- The binary search algorithm can be done as divide-and-conquer search algorithm and executes in logarithmic time.
- **Pseudo code:**

```
1. Start with the middle element:
     • If the search element is equal to the middle element of the array i.e., the middle value = number of elements in array/2, then return the index of the middle element.
     • If not, then compare the middle element with the search value
     • If the search element is greater than the number in the middle index, then select the elements to the right side of the middle index, and go to Step-1.
     • If the search element is less than the number in the middle index, then select the elements to the left side of the middle index, and start with Step-1.
2. When a match is found, display success message with the index of the element matched.
3. If no match is found for all comparisons, then display unsuccessful message.
```

10. Explain the Bubble sort algorithm with example.

- Bubble sort is a simple sorting algorithm.
- The algorithm starts at the beginning of the list of values stored in an array.
- It compares each pair of adjacent elements and swaps them if they are in the unsorted order.
- This comparison and passed to be continued until no swaps are needed, which indicates that the list of values stored in an array is sorted.
- The algorithm is a comparison sort, is named for the way smaller elements "bubble" to the top of the list.
- Although the algorithm is simple, it is too slow and less efficient when compared to insertion sort and other sorting methods.
- Assume list is an array of n elements. The swap function swaps the values of the given array elements.
- **Pseudo code**

```
1. Start with the first element i.e., index = 0, compare the current element with the next element of the array.
2. If the current element is greater than the next element of the array, swap them.
3. If the current element is less than the next or right side of the element, move to the next element. Go to Step 1 and repeat until end of the index is reached.
```

11. Explain the concept of Dynamic programming with suitable example.

- Dynamic programming is an algorithmic design method that can be used when the solution to a problem can be viewed as the result of a sequence of decisions.
- Dynamic programming approach is similar to divide and conquer.
- The given problem is divided into smaller and yet smaller possible sub-problems.
- Dynamic programming is used whenever problems can be divided into similar sub-problems. so that their results can be re-used to complete the process.
- Dynamic programming approaches are used to find the solution in optimized way.
- For every inner sub problem, dynamic algorithm will try to check the results of the previously solved sub-problems.
- The solutions of overlapped sub-problems are combined in order to get the better solution.
- Steps to do Dynamic programming
  - The given problem will be divided into smaller overlapping sub-problems.
  - An optimum solution for the given problem can be achieved by using result of smaller sub-problem.
  - Dynamic algorithms uses Memoization.
- Example:
  Fibonacci Iterative Algorithm with Dynamic programming approach

```
Initialize f0=0, f1 =1
step-1:    Print the initial values of Fibonacci f0 and f1
step-2:    Calculate fibanocci fib ← f0 + f1
step-3:    Assign f0← f1, f1← fib
step-4:    Print the next consecutive value of fibanocci fib
step-5:    Goto step-2 and repeat until the specified number of terms generated
```

12. Describe in detail the procedure Script mode programming.

(i) Script mode Programming:

- A script is a text file containing the Python statements.
- Python Scripts are reusable code.
- Once the script is created, it can be executed again and again without retyping.
- The Scripts are editable.

(ii) Creating Scripts in Python:

1. Choose File → New File or press Ctrl + N in Python shell window.
2. An untitled blank script text editor will be displayed on screen
3. Type the code in Script editor

(iii) Saving Python Script:

1. Choose File → Save or Press Ctrl + S
2. Now, Save As dialog box appears on the screen.
3. In the Save As dialog box, select the location where you want to save Python code, and type the file name in File Name box.
4. Python files are by default saved with extension .py.
5. Finally, click Save button to save Python script.

(iv) Executing Python Script:

- Choose Run → Run Module or Press F5

13. Explain input() and print() functions with examples.

- A program needs to interact with the user to accomplish the desired task; this can be achieved using Input-Output functions.
- The input() function helps to enter data at run time by the user
- The output function print() is used to display the result of the program on the screen after execution.

The print() function

- In Python, the print() function is used to display result on the screen.
- **The syntax:**

```
print(“string to be displayed as output ” )
print(variable )
print(“String to be displayed as output ”, variable)
print(“String1 ”, variable, “String 2”, variable, “String 3” ……)
```

- The print( ) evaluates the expression before printing it on the monitor.
- The print( ) displays an entire statement which is specified within print( ).
- Comma (,) is used as a separator in print( ) to print more than one item.
- **Example:**

```
>>> print (“Welcome to Python Programming”)
Welcome to Python Programming
>>> x = 5
>>> y = 6
>>> z = x + y
>>> print (z)
11
```

The input( ) function

- In Python, input( ) function is used to accept data as input at run time.
- **The syntax:**

```
Variable = input (“prompt string”)
```

- Where, prompt string in the syntax is a statement or message to the user, to know what input can be given.
- If a prompt string is used, it is displayed on the monitor; the user can provide expected data from the input device.
- The input( ) takes whatever is typed from the keyboard and stores the entered data in the given variable.
- If prompt string is not given in input( ) no message is displayed on the screen.
- The input ( ) accepts all data as string or characters but not as numbers.
- If a numerical value is entered, the input values should be explicitly converted into numeric data type. The int( ) function is used to convert string data as integer data explicitly.
- **Example:**

```
>>> city=input (“Enter Your City: ”)
Enter Your City: Madurai
>>> print (“I am from “, city)
I am from Madurai
```

14. Discuss in detail about Tokens in Python

Python breaks each logical line into a sequence of elementary lexical components known as Tokens.

1) Identifiers,
2) Keywords,
3) Operators,
4) Delimiters and
5) Literals.

Whitespace separation is necessary between tokens, identifiers or keywords.

(1) Identifiers

- An Identifier is a name used to identify a variable, function, class, module or object.
- An identifier must start with an alphabet (A..Z or a..z) or underscore (_).
- Identifiers may contain digits (0 .. 9)
- Python identifiers are case sensitive i.e. uppercase and lowercase letters are distinct.
- Identifiers must not be a python keyword.
- Python does not allow punctuation character such as %,$, @ etc., within identifiers.
- **Examples:**

  Sum, total_marks, regno, num1

(2) Keywords

- Keywords are special words used by Python interpreter to recognize the structure of program.
- As these words have specific meaning for interpreter, they cannot be used for any other purpose.
- **Example:**

  and, del, global etc.,

(3) Operators

Operators are special symbols which represent computations, conditional matching etc.

The value of an operator used is called operands.
Operators are categorized as

i. Arithmetic operators
ii. Relational or Comparative operators
iii. Logical operators
iv. Assignment operators
v. Conditional operator

(i) Arithmetic operators

- An arithmetic operator is a mathematical operator that takes two operands and performs a calculation on them.
- **Operators:**
  +, -, *, /, %, **, //

(ii) Relational or Comparative operators

- A Relational operator is also called as Comparative operator which checks the relationship between two operands.
- If the relation is true, it returns True; otherwise it returns False.
- **Operators:**
  ==, >, >=, <, <=, !=

(iii) Logical operators

- Logical operators are used to perform logical operations on the given relational expressions.
- Operators:
  and, or, not.

(iv) Assignment operators

- Assignment operator to assign values to variable.
- **Operators**
  +=, -=, *=, /=, %=, **=, //=

(v) Conditional operator

- Ternary operator is also known as conditional operator that evaluate based on a condition being true or false.
- **The Syntax:**
  Variable Name = [on_true] if [Test expression] else [on_false]

(4) Delimiters

- Python uses the symbols and symbol combinations as delimiters in expressions, lists, dictionaries and strings.
- Examples:
  ( ), { }, [ ]

(5) Literals

- Literal is a raw data given in a variable or constant.
- Types of Literals:
  i. Numeric
  ii. String
  iii. Boolean
  iv. Escape sequences

(i) Numeric Literals

- Numeric Literals consists of digits and are immutable (unchangeable).
- Numeric literals can belong to 3 different numerical types Integer, Float and Complex.

(ii) String Literals

- String literal is a sequence of characters surrounded by quotes.
- Python supports single, double and triple quotes for a string.

(iii) Boolean Literals

- A Boolean literal can have any of the two values: True or False.

(iv) Escape Sequences

- In Python strings, the backslash "\" is a special character, also called the "escape" character.
- It is used in representing certain whitespace characters: "\t" is a tab, "\n" is a newline, and "\r" is a carriage return.

15. Write a detail note on for loop

- The forloop is the most comfortable loop.
- It is also an entry check loop.

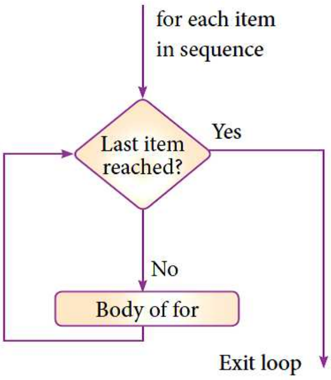
- The condition is checked in the beginning and the body of the loopis executed if it is only True otherwise the loop is not executed.
- Syntax:

```
        for counter_variable in sequence:
                statements-block 1
        [else: # optional block
                statements-block 2]
```

- Usually in Python, forloop uses the range()function in the sequence to specify the initial, final and increment values.
- The range()generates a list of values starting from starttill stop**-1.**
- The syntax of range():

  range (start,stop,[step])

  1. start – refers to the initial value
  2. stop – refers to the final value
  3. step – refers to increment value, this is optional part.
- Flowchart



- Example:

```
        for i in range(2,10,2):
                print (i,end=' ')
        else:
                print ("\nEnd of the loop")
```

Output:

```
        2 4 6 8
        End of the loop
```

16. Write a detail note on if..else..elif statement with suitable example.

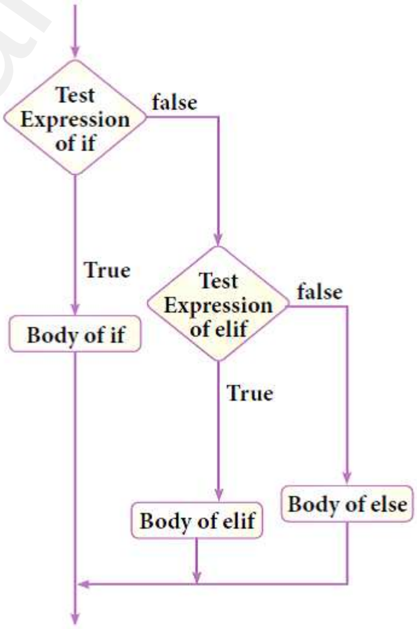
Syntax:

```
    if <condition-1>:
            statements-block 1
    elif<condition-2>:
            statements-block 2
    else:
            statements-block n
```

In the syntax of if..elif..else mentioned above, condition-1 is tested if it is true thenstatements-block1 is executed, otherwise the control checks condition-2, if it is true statementsblock2is executed and even if it fails statements-block n mentioned in else part is executed.

'elif' clause combines if..else-if..else statements to one if..elif…else. 'elif' can be considered to be abbreviation of 'else if'. In an 'if' statement there is no limit of 'elif' clause that can be used, but an 'else' clause if used should be placed at the end.

Flowchart:



Example:

```
m1=int (input("Enter mark in first subject : "))
m2=int (input("Enter mark in second subject : "))
avg= (m1+m2)/2
if avg>=80:
        print ("Grade : A")
elifavg>=70 and avg<80:
        print ("Grade : B")
elifavg>=60 and avg<70:
        print ("Grade : C")
```

```
elifavg>=50 and avg<60:
        print ("Grade : D")
else:
        print ("Grade : E")
```

Output:

```
Enter mark in first subject : 34
Enter mark in second subject : 78
Grade : D
```

17. Write a program to display all 3 digit odd numbers.

18. Explain the different types of function with an example.

In Python, the functions are classified as different types.

I. User defined functions
II. Built-in functions
III. Lambda functions
IV. Recursive functions

(I) User defined functions:

When defining functions there are multiple things that need to be noted:

- Function blocks begin with the keyword **"def"** followed by function name and parenthesis ().
- Any input parameters or arguments should be placed within these parentheses when define a function.
- The code block always comes after a colon (:) and is indented.
- The statement **"return [expression]"** exits a function, optionally passing back an expression to the caller.
- A **"return"** with no arguments is the same as return None.

syntax of creating a user defined function:

```
def <function_name( [parameter1, parameter2……])>:
        <block of statements>
Return <expression/None>
```

Example:

```
def leap(year):
   if((year%4==0 and year%100!=0) or (year%400==0)):
        print(year, " is a Leap year")
   else:
        print(year, " is not a Leap year")

y=int(input("Enter a year : "))
leap(y)
```

(II) Built-in Functions:

The functions which are available with Python by default is known as built-in functions.

(III) Lambda functions

- In Python, anonymous function is a function that is defined without a name.
- While normal functions are defined using the def keyword, in Python anonymous functions are defined using the lambda keyword.
- Hence, anonymous functions are also called as lambda functions.

Use of lambda or anonymous function:

- Lambda function is mostly used for creating small and one-time anonymous function.
- Lambda functions are mainly used in combination with the functions like filter(), map() and reduce().

Syntax of lambda function:

```
lambda [argument(s)]: expression
```

Example:

```
sqr=lambda x:x**2
num=int(input("Enter a number: "))
print("The sequre of ",num, " is ", sqr(num))
```

(IV) Recursive functions

- When a function calls itself is known as recursion.
- Recursion works like loop but sometimes it makes more sense to use recursion than loop.

- The condition that is applied in any recursive function is known as base condition.
- A base condition is must in every recursive function otherwise it will continue to execute like an infinite loop.

Working of recursive function:

1. Recursive function is called by some external code.
2. If the base condition is met then the program gives meaningful output and exits.
3. Otherwise, function does some required processing and then calls itself to continue recursion.

Example:

```
def fact(n):
        if n == 0:
                return 1
        else:
                return n * fact (n-1)
print (fact (0))
print (fact (5))
```

19. Explain the scope of variables with an example.

- Scope of variable refers to the part of the program, where it is accessible, i.e., area where you can refer (use) it.
- Types of scopes:
    - o Local scope and Global scope.

(I) Local Scope:

- A variable declared inside the function's body or in the local scope is known as local variable.

Rules of local variable:

- A variable with local scope can be accessed only within the function/block that it is created in.
- When a variable is created inside the function/block, the variable becomes local to it.
- A local variable only exists while the function is executing.
- The format arguments are also local to function.

Example:

```
def loc():
        y=0
print(y)
loc()
```

(II) Global Scope:

- Defining a variable outside the scope of any function/block.
- Global scope can be used anywhere in the program.

Basic rules for global keyword in python:

- When we define a variable outside a function, it’s global by default. You don’t have to use global keyword.
- We use global keyword to read and write a global variable inside a function.
- Use of global keyword outside a function has no effect

Example:

```
c = 1
def add():
        print(c)
add()
```

20. Explain the following built-in functions.

(a) id()
(b) chr()
(c) round()
(d) type()
(e) pow()

(a) id( )

- Returns the “identity of an object” ie. the memory address of the object.
- **Example:**

```
X=15
print("Address of X is: ",id(X))
```

Output:

```
Address of X is:  264398144
```

(b) chr( )

- Returns the Unicode character for the given ASCII value.
- Example:

```
Ch=65
print(“Unicode character of ”, Ch, “is: ”, chr(Ch))
```

Output:

```
Unicode character of  65 is : A
```

(c) round( )

- Returns the nearest integer to its input.
- General format:

  round(number [,ndigits])

  1) **number** argument is used to specify the value to be rounded.
  2) **ndigits** argument is used to specify the number of decimal digits desired after rounding.
- Example:

```
        x=17.9
        y=22.81129
        print('x value is rounded to',
round(x))
        print('x value is rounded to',
round(y,2))
```

Output:

```
x value is rounded to 18
x value is rounded to 22.81
```

(d) type( )

- Returns the type of an object for the given single object.
- Example:

```
X= 15
Y= ‘A’
Z = True
print(type(X))
print(type(Y))
print(type(Z))
```

Output:

```
<class 'int'>
<class 'str'>
<class 'bool'>
```

(e) pow( )

- Returns the computation of a raised to the power of b.
- Example:

```
x=5
y=2
print(pow(x,y))
```

Output:

```
25
```

21. Explain recursive function with an example.

- When a function calls itself is known as recursion.
- Recursion works like loop but sometimes it makes more sense to use recursion than loop.
- The condition that is applied in any recursive function is known as base condition.
- A base condition is must in every recursive function otherwise it will continue to execute like an infinite loop.

Working of recursive function:

- Recursive function is called by some external code.
- If the base condition is met then the program gives meaningful output and exits.
- Otherwise, function does some required processing and then calls itself to continue recursion.

Example:

```
def fact(n):
        if n == 0:
                return 1
        else:
                return n * fact (n-1)
print (fact (0))
print (fact (5))
```

22. Explain about string operators in python with suitable example.

String Operators:

- Python provides the following operators for string operations. These operators are useful to manipulate string.

(i) Concatenation (+)

- Joining of two or more strings is called as Concatenation.
- The plus (+) operator is used to concatenate strings in python.

Example

```
>>> "welcome" + "Python"
        'welcomePython'
```

(ii) Append (+ =)

- Adding more strings at the end of an existing string is known as append.
- The operator += is used to append a new string with an existing string.

Example

```
>>> str1="Welcome to "
>>> str1+="Learn Python"
>>> print (str1)
        Welcome to Learn Python
```

(iii) Repeating (*)

- The multiplication operator (*) is used to display a string in multiple number of times.

Example

```
>>> str1="Welcome "
>>> print (str1*4)
        Welcome Welcome Welcome
Welcome
```

(iv) String slicing

- Slice is a substring of a main string.
- A substring can be taken from the original string by using [ ] operator and index or subscript values. Thus, [ ] is also known as slicing operator.
- Using slice operator, you have to slice one or more substrings from a main string.
- **General format of slice operation:**
  str[start:end]

Example I: slice a single character from a string

```
>>> str1="THIRUKKURAL"
>>> print (str1[0])
        T
```

Example II : slice a substring from index 0 to 4

```
>>> print (str1[0:5])
THIRU
```

23. What the different ways to insert an element in a list. Explain with suitable example.

- In Python, append() function is used to add a single element and extend() function is used to add more than one element to an existing list.
- Syntax:
  List.append (element to be added)
  List.extend ([elements to be added])

In extend( ) function, multiple elements should be specified within square bracket as arguments of the function.

- **Example**

```
>>> Mylist=[34, 45, 48]
>>> Mylist.append(90)
>>> print(Mylist)
        [34, 45, 48, 90]
```

- The append( ) function in Python is used to add more elements in a list. But, it includes elements at the end of a list.
- The insert( ) function is used to insert an element at any position of a list.
- Syntax:
  List.insert (position index, element)
- Example:

```
        MyList=[34,98,47,'Apple',     'Mango',
'Orange', 'Pineapple' ]
        print(MyList)
                [34,98,47,'Apple',     'Mango',
        'Orange', 'Pineapple' ]
        MyList.insert(3, 'Banana')
        print(MyList)
                [34,98,47, 'Banana', 'Apple',
        'Mango', 'Orange', 'Pineapple' ]
```

24. What is the purpose of range( )? Explain with an example.

- The range( ) is a function used to generate a series of values in Python.
- Using range( ) function, you can create list with series of values.
- Syntax of range ( ) function:
  range (start value, end value, step value)
- The range( ) function has three arguments.
  1. **start value** – beginning value of series. Zero is the default beginning value.

2. **end value** – upper limit of series. Python takes the ending value as upper limit – 1.
3. **step value** – It is an optional argument, which is used to generate different interval of values.

- Example:

```
for x in range (2, 11, 2):
print(x)
```

- **Output**

```
2
4
6
8
10
```

24. What is nested tuple? Explain with an example.

- In Python, a tuple can be defined inside another tuple; called Nested tuple.
- In a nested tuple, each tuple is considered as an element.
- The for loop will be useful to access all the elements in a nested tuple.
- Example:

```
Toppers = (("Vinodini", "XII-F", 98.7),
          ("Soundarya", "XII-H", 97.5),
          ("Tharani", "XII-F", 95.3),
          ("Saisri", "XII-G", 93.8))
for i in Toppers:
    print(i)
```

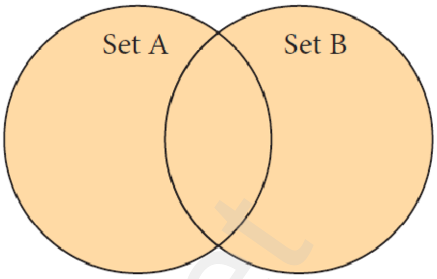
- Output:

```
('Vinodini', 'XII-F', 98.7)
('Soundarya', 'XII-H', 97.5)
('Tharani', 'XII-F', 95.3)
('Saisri', 'XII-G', 93.8)
```

26. Explain the different set operations supported by python with suitable example.

(i) Union:

- It includes all elements from two or more sets
- In python, the operator | is used to union of two sets.
- The function union( ) is also used to join two sets in python.



- Example 1: Using union operator

```
setA={2,4,6,8}
setB={'A', 'B', 'C', 'D'}
Uset=setA|setB
print(Uset)
```

Output:

```
{2, 4, 6, 8, 'A', 'D', 'C', 'B'}
```

- Example 2: Using union function

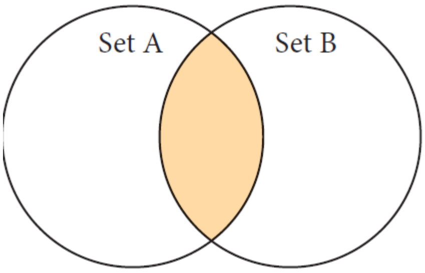
```
setA={2,4,6,8}
setB={'A', 'B', 'C', 'D'}
setU=setA.union(setB)
print(setU)
```

Output:

```
{'D', 2, 4, 6, 8, 'B', 'C', 'A'}
```

(ii) Intersection:

- It includes the common elements in two sets
- The operator & is used to intersect two sets in python.
- The function intersection( ) is also used to intersect two sets in python.



- Example 1: Using intersection operator

```
setA={'A', 2, 4, 'D'}
setB={'A', 'B', 'C', 'D'}
print(setA & setB)
```

- Output:

```
{'A', 'D'}
```

- Example 2: Using intersection function

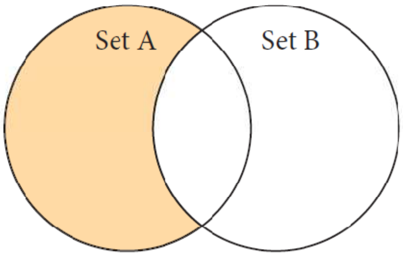
```
setA={'A', 2, 4, 'D'}
setB={'A', 'B', 'C', 'D'}
print(setA.intersection(set_B))
```

- Output:

```
{'A', 'D'}
```

(iii) Difference:

- It includes all elements that are in first set (say set A) but not in the second set (say set B)
- The minus (-) operator is used to difference set operation in python.
- The function **difference( )** is also used to difference operation.



- Example 1: Using difference operator

```
setA={'A', 2, 4, 'D'}
setB={'A', 'B', 'C', 'D'}
print(setA - setB)
```

- Output:

```
{2, 4}
```

- Example 2: Using difference function

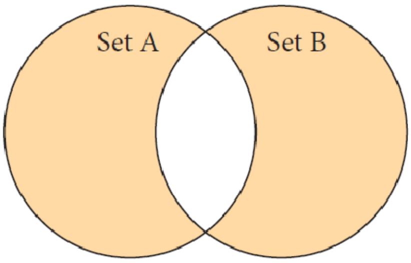
```
setA={'A', 2, 4, 'D'}
setB={'A', 'B', 'C', 'D'}
print(setA.diff erence(setB))
```

- Output:

```
{2, 4}
```

(iv) Symmetric difference:

- It includes all the elements that are in two sets (say sets A and B) but not the one that are common to two sets.
- The caret (^) operator is used to symmetric difference set operation in python.
- The function **symmetric_difference( )** is also used to do the same operation.



- Example 1: Using symmetric difference operator

```
setA={'A', 2, 4, 'D'}
setB={'A', 'B', 'C', 'D'}
print(setA ^ setB)
```

- **Output:**

```
{2, 4, 'B', 'C'}
```

- Example 2: using symmetric difference function

```
setA={'A', 2, 4, 'D'}
setB={'A', 'B', 'C', 'D'}
print(setA.symmetric_difference(setB))
```

- **Output:**

```
{2, 4, 'B', 'C'}
```

27. Explain the different types of data model.

Following are the different types of a Data Model

1. Hierarchical Model
2. Relational Model
3. Network Database Model
4. Entity Relationship Model
5. Object Model

1. Hierarchical Model

- Hierarchical model was developed by IBM as Information Management System.
- In Hierarchical model, data is represented as a simple tree like structure form.
- This model represents a one-to-many relationship ie parent-child relationship.
- One child can have only one parent but one parent can have many children.
- This model is mainly used in IBM Main Frame computers.

2. Relational Model

- The Relational Database model was first proposed by E.F. Codd in 1970. Nowadays, it is the most widespread data model used for database applications around the world.

- The basic structure of data in relational model is tables (relations).
- All the information's related to a particular type is stored in rows of that table.
- Hence tables are also known as relations in a relational model. A relation key is an attribute which uniquely identifies a particular tuple (row in a relation (table)).

3. Network Model

- Network database model is an extended form of hierarchical data model.
- The difference between hierarchical and Network data model is:
  - In hierarchical model, a child record has only one parent node,
  - In a Network model, a child may have many parent nodes. It represents the data in many to-many relationships.
  - This model is easier and faster to access the data.

4. Entity Relationship Model. (ER model)

- In this database model, relationship are created by dividing the object into entity and its characteristics into attributes.
- It was developed by Chen in 1976. This model is useful in developing a conceptual design for the database.
- It is very simple and easy to design logical view of data. The developer can easily understand the system by looking at ER model constructed.

5. Object Model

- Object model stores the data in the form of objects, attributes and methods, classes and Inheritance.
- This model handles more complex applications, such as Geographic information System (GIS), scientific experiments, engineering design and manufacturing.
- It is used in file Management System. It represents real world objects, attributes and behaviors. It provides a clear modular structure.
- It is easy to maintain and modify the existing code.

28. Explain the different types of relationship mapping.

1. One-to-One Relationship
2. One-to-Many Relationship
3. Many-to-One Relationship
4. Many-to-Many Relationship

1. One-to-One Relationship:

- In One-to-One Relationship, one entity is related with only one other entity.
- One row in a table is linked with only one row in another table and vice versa.
- For example: A student can have only one exam number

2. One-to-Many Relationship:

- In One-to-Many relationship, one entity is related to many other entities.
- One row in a table A is linked to many rows in a table B, but one row in a table B is linked to only one row in table A.
- For example: One Department has many staff members.

3. Many-to-One Relationship:

- In Many-to-One Relationship, many entities can be related with only one in the other entity.
- For example: A number of staff members working in one Department.
- Multiple rows in staff members table is related with only one row in Department table.

4. Many-to-Many Relationship

- A many-to-many relationship occurs when multiple records in a table are associated with multiple records in another table.

29. Differentiate DBMS and RDBMS.

DBMS	RDBMS
Database Management System	Relational DataBase Management System
Navigational model ie data by linked records	Relational model (in tables). ie data in tables as row and column

Exhibit	Not Present
Not performed	RDBMS uses normalization to reduce redundancy
Consumes more time	Faster, compared to DBMS.
Does not use.	used to establish relationship. Keys are used in RDBMS.
Inefficient, Error prone and insecure.	Efficient and secure.
Not supported	Supported by RDBMS.
Dbase, FoxPro.	SQL server, Oracle, mysql, MariaDB, SQLite.

30. Explain the different operators in Relational algebra with suitable examples.

- Relational Algebra is divided into various groups
- Unary Relational Operations
  1. SELECT (symbol : σ)
  2. PROJECT (symbol : Π)
- Relational Algebra Operations from Set Theory
  3. UNION (∪)
  4. INTERSECTION (∩)
  5. DIFFERENCE (−)
  6. CARTESIAN PRODUCT (X)

(1) SELECT (symbol : σ)

- General form σc (R) with a relation R and a condition C on the attributes of R.
- The SELECT operation is used for selecting a subset with tuples according to a given condition.
- Select filters out all tuples that do not satisfy C.

(2) PROJECT (symbol : Π)

- The projection eliminates all attributes of the input relation but those mentioned in the projection list.
- The projection method defines a relation that contains a vertical subset of Relation.

(3) UNION (Symbol :∪)

- It includes all tuples that are in tables A or in B. It also eliminates duplicates.
- Set A Union Set B would be expressed as A ∪ B

(4) SET DIFFERENCE (Symbol : -)

- The result of A – B, is a relation which includes all tuples that are in A but not in B.
- The attribute name of A has to match with the attribute name in B.

(5) INTERSECTION (symbol : ∩) A ∩ B

- Defines a relation consisting of a set of all tuple that are in both in A and B.
- However, A and B must be union-compatible.

(6) PRODUCT OR CARTESIAN PRODUCT (Symbol : X)

- Cross product is a way of combining two relations.
- The resulting relation contains, both relations being combined.
- A x B means A times B, where the relation A and B have different attributes.
- This type of operation is helpful to merge columns from two relations.

31. Explain the characteristics of DBMS.

1. Data stored in table	Data is never directly stored into the database. Data is stored into tables, created inside the database. DBMS also allows to have relationship between tables which makes the data more meaningful and connected.
2. Reduced Redundancy	In the modern world hard drives are very cheap, but earlier when hard drives were too expensive, unnecessary repetition of data in database was a big problem But DBMS follows Normalisation which divides the data in

	such a way that repetition is minimum.
3.Data Consistency	On live data, it is being continuously updated and added, maintaining the consistency of data can become a challenge. But DBMS handles it by itself.
4. Support Multiple user and Concurrent Access	DBMS allows multiple users to work on it(update, insert, delete data) at the same time and still manages to maintain the data consistency.
5.Query Language	DBMS provides users with a simple query language, using which data can be easily fetched, inserted, deleted and updated in a database.
6. Security	The DBMS also takes care of the security of data, protecting the data from unauthorized access. In a typical DBMS, we can create user accounts with different access permissions, using which we can easily secure our data by restricting user access.
7. DBMS Supports Transactions	It allows us to better handle and manage data integrity in real world applications where multi-threading is extensively used.

32. Write the different types of constraints and their functions.

Constraint:

- Constraint is a condition applicable on a field or set of fields.

Types of constraints:

- Unique constraint
- Primary key constraint
- Default constraint
- Check constraint

Unique constraint:

- This constraint ensures that no two rows have the same value in the specified columns.
- The unique constraint can be applied only to fields that have also been declared as not null.
- Example:
  Create table student (admno integer NOT NULL UNIQUE);

Primary key constraint:

- The constraint declares a field as a Primary key which helps to uniquely identify a record.
- The primary key does not allow NULL values and therefore a field declared as primary key must have the NOT NULL constraint.
- Example:
  Create table student (
  admno integer(4) not null primary key,
  sname char(2) not null,
  mark1 integer(2), mark2 integer(2));

Default constraint:

- The default constraint is used to assign a default value for the field.
- When no value is given for the specified field having default constraint, automatically the default value will be assigned to the field.

Check constraint:

- This constraint helps to set a limit value placed for a field.
- When we define a check constraint on a single column, it allows only the restricted values on that field.
- Example:
  Create table student (
  admno integer(4) not null primary key,
  sname char(2) not null,

```
mark1 integer(2) (check<=70),
mark2 integer(2) (check<=90));
```

33. Consider the following employee table. Write SQL commands for the questions (i) to (v).

EMP CODE	NAME	DESIG	PAY	ALLO WANCE
S1001	Hariharan	Supervisor	29000	12000
P1002	Shaji	Operator	10000	5500
P1003	Prasad	Operator	12000	6500
C1004	Manjima	Clerk	8000	4500
M1005	Ratheesh	Mechanic	20000	7000

(i) To display the details of all employees in descending order of pay.
(ii) To display all employees whose allowance is between 5000 and 7000.
(iii) To remove the employees who are mechanic.
(iv) To add a new row.
(v) To display the details of all employees who are operators.

Answer:

(i) SELECT * from emp ORDER BY pay DESC;
(ii) SELECT * from emp WHERE allow BETWEEN 5000.00 and 7000.00;
(iii) DELETE from emp WHERE desig='Mechanic';
(iv) INSERT INTO emp (empcode, ename, Desig, Pay, Allow) VALUES (1006, 'Kumar', 'Manager', 30000.00, 17000.00);
(v) SELECT * from emp WHERE desig='Operator';

34. What are the components of SQL? Write the commands in each.

Components of SQL:

- DML – Data Manipulation Language
- DDL – Data Definition Language
- DCL – Data Control Language
- TCL – Transaction Control Language
- DQL – Data Query Language

DML – Data Manipulation Language:

- INSERT, DELETE, UPDATE.

DDL – Data Definition Language:

- CREATE, ALTER, DROP, TRUNCATE.

DCL - Data Control Language:

- GRANT, REVOKE

TCL – Transactional Control Language:

- COMMIT, ROLL BACK, SAVE POINT

DQL – Data Query Language:

- SELECT

35. Construct the following SQL statements in the student table-
(i) SELECT statement using GROUP BY clause.
(ii) SELECT statement using ORDER BY clause.

Answer:

```
SELECT * FROM Student ORDER BY
Name;
SELECT Gender, count(*) FROM Student
GROUP BY Gender;
```

36. Write a SQL statement to create a table for employee having any five fields and create a table constraint for the employee table.

```
CREATE TABLE Employee
(Empno integer(4) NOT NULL,
EmpName varchar (20) NOT NULL,
Gender char (1),
Age integer(2),
Dept varchar(10),
PRIMARY KEY (Empno));
```

37. Differentiate Excel file and CSV file.

Excel	CSV
Excel is a binary file that holds information about all the worksheets in a file, including both content and formatting	CSV format is a plain text format with a series of values separated by commas.
XLS files can only be read by applications that have been especially written to read their format, and can only be written in the same way.	CSV can be opened with any text editor in Windows like notepad, MS Excel, OpenOffice, etc.
Excel is a spreadsheet that saves files into its own proprietary format	CSV is a format for saving tabular information into a

viz. xls or xlsx	delimited text file with extension .csv
Excel consumes more memory while importing data	Importing CSV files can be much faster, and it also consumes less memory

38. Write the different methods to read a File in Python.

- You can read the contents of CSV file with the help of **csv.reader()** method.
- **The reader function is designed to take each line of the file and make a list of all columns.**
- Using this method one can read data from csv files of different formats like quotes (" "), pipe (|) and comma (,).
- **The syntax for csv.reader()**

  sv.reader(fileobject,delimiter,fmtparams)

Methods to read a file

1. CSV file - data with default delimiter comma (,)
2. CSV file - data with Space at the beginning
3. CSV file - data with quotes
4. CSV file - data with custom Delimiters

39. Write the rules to be followed to format the data in a CSV file.

1. Each record (row of data) is to be located on a separate line, delimited by a line break by pressing enter key.
2. The last record in the file may or may not have an ending line break.
3. There may be an optional header line appearing as the first line of the file with the same format as normal record lines. The header will contain names corresponding to the fields in the file and should contain the same number of fields as the records in the rest of the file.
4. Within the header and each record, there may be one or more fields, separated by commas. Spaces are considered part of a field and should not be ignored. The last field in the record must not be followed by a comma.
5. Each field may or may not be enclosed in double quotes. If fields are not enclosed with double quotes, then double quotes may not appear inside the fields.
6. Fields containing line breaks (CRLF), double quotes, and commas should be enclosed in double-quotes.
7. If double-quotes are used to enclose fields, then a double-quote appearing inside a field must be preceded with another double quote.

40. Explain each word of the following command.

Python <filename.py> -<i> <C++ filename without cpp extension>

Python	The keyword to execute the Python program from command line
<filename.py>	Name of the Python program to executed
-<i>	The input mode
<C++ filename without cpp extension>	The name of C++ file to be compiled and executed

41. What is the purpose of sys, os, getopt module in Python. Explain

(i) Python's sys module:

- This module provides access to some variables used by the interpreter and to functions that interact strongly with the interpreter.
- ***sys.argv*** is the list of command-line arguments passed to the Python program. Argv contains all the items that come along via the command-line input, it's basically an array holding the command-line arguments of the program.

(ii) Python's OS Module:

- The OS module in Python provides a way of using operating system dependent functionality.
- The functions that the OS module allows you to interface with the Windows operating system where Python is running on.
- ***os.system( ):*** Execute the C++ compiling command (a string contains Unix, C

command which also supports C++ command) in the shell (Here it is Command Window).

(iii) Python getopt module:

- The getopt module of Python helps you to parse (split) command-line options and arguments. This module provides two functions to enable command-line argument parsing.
- ***getopt.getopt*** method: This method parses command-line options and parameter list.
- The syntax:
  <opts>,<args>=getopt.getopt(argv, options, [long_options])

42. Write the syntax for getopt() and explain its arguments and return values

- This method parses command-line options and parameter list.
- The syntax:
  <opts>,<args>=getopt.getopt(argv, options, [long_options])
  - o ***argv*** − This is the argument list of values to be parsed (splited). In our program the complete command will be passed as a list.
  - o ***options*** − This is string of option letters that the Python program recognize as, for input or for output, with options (like 'i' or 'o') that followed by a colon (:). Here colon is used to denote the mode.
  - o ***long_options*** −This parameter is passed with a list of strings. Argument of Long options should be followed by an equal sign ('=').
- getopt() method returns value consisting of two elements.
- Each of these values are stored separately in two different list (arrays) ***opts*** and ***args***.
  - o ***Opts*** contains list of splitted strings like mode, path and args contains any string if at all not splitted because of wrong path or mode.
  - o ***args*** will be an empty array if there is no error in splitting strings by getopt().

43. Write in brief about SQLite and the steps used to use it.

- SQLite is a simple relational database system, which saves its data in regular data files or even in the internal memory of the computer.
- It is designed to be embedded in applications, instead of using a separate database server program such as MySQLor Oracle.
- SQLite is fast, rigorously tested, and flexible, making it easier to work. Python has a native library for SQLite.
- Steps to use SQLite:
  Step 1: Import sqlite3
- Step 2: Create a connection using connect() method and pass the name of the database File
  - Passing the name of the database to be accessed. If the database already exists the connection will open the same. Otherwise, Python will open a new database file with the specified name.
- Step 3: Set the cursor object cursor = connection. cursor( )
  - A control structure used to traverse and fetch the records of the database.

44. Write the Python script to display all the records of the following table using fetchmany( )

Icode	ItemName	Rate
1003	Scanner	10500
1004	Speaker	3000
1005	Printer	8000
1008	Monitor	15000
1010	Mouse	700

Answer:

```
import sqlite3
connection = sqlite3.connect("Spares.db")
cursor = connection.cursor()
cursor.execute("SELECT * FROM
hardware")
print("fetching all records:")
result = cursor.fetchmany(5)
print(result)
```

45. What is the use of HAVING clause? Give an example python script

- Having clause is used to filter data based on the group functions. This is similar to WHERE condition but can be used only with group functions.
- Group functions cannot be used in WHERE Clause but can be used in HAVING clause.
- **Example:**

```
import sqlite3
connection = sqlite3.connect("Academy.db")
cursor = connection.cursor()
cursor.execute("SELECT
GENDER,COUNT(GENDER) FROM
Student GROUP BY GENDER HAVING
COUNT(GENDER)>3")
result = cursor.fetchall()
co = [i[0] for i in cursor.description]
print(co)
print(result)
```

46. Consider the following table Supplier and item. Write a python script for (i) to (ii)

SUPPLIER

Suppno	Name	City	Icode	SuppQty
S001	Prasad	Delhi	1008	100
S002	Anu	Bangalore	1010	200
S003	Shahid	Bangalore	1008	175
S004	Akila	Hydrabad	1005	195
S005	Girish	Hydrabad	1003	25
S006	Shylaja	Chennai	1008	180
S007	Lavanya	Mumbai	1005	325

(i) Display Name, City and Icode of suppliers who do not reside in Delhi.
(ii) Increment the SuppQty of Akila by 40

Answer:

(i)

```
import sqlite3
connection = sqlite3.connect("ABC.db")
cursor = connection.cursor()
cursor.execute("SELECT name, city, icode
FROM supplier WHERE NOT (city="Delhi")
result = cursor.fetchall()
print(*result,sep="\n")
```

(ii)

```
import sqlite3
connection = sqlite3.connect("ABC.db")
cursor = connection.cursor()
cursor.execute("UPDATE suppqty+40
FROM supplier WHERE name= "Akila"
result = cursor.fetchall()
print(*result,sep="\n")
```

47. Explain in detail the types of pyplots using Matplotlib.

(i) Line Chart

- A Line Chart or Line Graph is a type of chart which displays information as a series of data points called 'markers' connected by straight line segments.
- A Line Chart is often used to visualize a trend in data over intervals of time – a time series – thus the line is often drawn chronologically.

(ii) Bar Chart

- A BarPlot (or BarChart) is one of the most common type of plot.
- It shows the relationship between a numerical variable and a categorical variable.
- Bar chart represents categorical data with rectangular bars.
- Each bar has a height corresponds to the value it represents. The bars can be plotted vertically or horizontally.
- It's useful when we want to compare a given numeric value on different categories. To make a bar chart with Matplotlib, we can use the plt.bar() function.

(iii) Pie Chart

- Pie Chart is probably one of the most common type of chart.
- It is a circular graphic which is divided into slices to illustrate numerical proportion.
- The point of a pie chart is to show the relationship of parts out of a whole.
- To make a Pie Chart with Matplotlib, we can use the ***plt.pie()*** function.
- The autopct parameter allows us to display the percentage value using the Python string formatting.

48. Explain the various buttons in a matplotlib window.

- **Home Button:**

The Home Button will help once you have begun navigating your chart. If you ever want to return back to the original view, you can click on this.

- **Forward/Back buttons:**
  These buttons can be used like the Forward and Back buttons in your browser. You can click these to move back to the previous point you were at, or forward again.

- **Pan Axis:**
  This cross-looking button allows you to click it, and then click and drag your graph around.

- **Zoom:**
  The Zoom button lets you click on it, then click and drag a square that you would like to zoom into specifically. Zooming in will require a left click and drag. You can alternatively zoom out with a right click and drag.

- **Configure Subplots:**
  This button allows you to configure various spacing options with your figure and plot.

- **Save Figure:**
  This button will allow you to save your figure in various forms.

49. Explain the purpose of the following functions:

a. plt.xlabel
   Assign labels to x axis

b. plt.ylabel
   Assign labels to y axis

c. plt.title
   Assign plot title

d. plt.legend()
   Assign default legend

e. plt.show()
   Used to invoke graph window

******

All the Best