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CONTENTS

UNIT-I PROBLEM SOLVING TECHNIQUES

CHAPTER 1

FUNCTION

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

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
[Ans. (a) Subroutines]

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
[Ans. (b) Function]

3. Which of the following is a distinct syntactic block? *[PTA-6]*
(a) Subroutines (b) Function
(c) Definition (d) Modules
[Ans. (c) Definition]

4. The variables in a function definition are called as *[PTA-2; QY-2019]*
(a) Subroutines (b) Function
(c) Definition (d) Parameters
[Ans. (d) Parameters]

5. The values which are passed to a function definition are called *[HY-2019]*
(a) Arguments (b) Subroutines
(c) Function (d) Definition
[Ans. (a) Arguments]

6. Which of the following are mandatory to write the type annotations in the function definition? *[PTA-4]*
(a) Curly braces (b) Parentheses
(c) Square brackets (d) indentations
[Ans. (b) Parentheses]

7. Which of the following defines what an object can do?
(a) Operating System (b) Compiler
(c) Interface (d) Interpreter
[Ans. (c) Interface]

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

(a) Operating System (b) Compiler
(c) Implementation (d) Interpreter

[Ans. (c) Implementation]

9. **The functions which will give exact result when same arguments are passed are called** *[PTA-3]*

(a) Impure functions (b) Partial Functions
(c) Dynamic Functions (d) Pure functions

[Ans. (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

[Ans. (a) Impure function]

Part - II

Answer the following questions (2 marks)

1. **What is a subroutine?** *[PTA-1; HY-2019]*

Ans. (i) 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.

(ii) In Programming languages these subroutines are called as Functions.

2. **Define Function with respect to Programming language.**

Ans. A function is a unit of code that is often defined within a greater code structure. Specifically, a function contains a set of code that works on many kinds of inputs, like variants, expressions and produces a concrete output.

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

Ans. X:= (78) has an expression in it but (78) is not itself an expression. Rather, it is a function definition. Definitions bind values to names, in this case the value 78 being bound to the name 'X'.

4. **Differentiate interface and implementation.**

Ans. The difference between interface and implementation is

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

Ans. (i) Recursive function
(ii) Normal function
(iii) Recursive function

Part - III

Answer the following questions (3 marks)

1. **Mention the characteristics of Interface.**

Ans. (i) The class template specifies the interfaces to enable an object to be created and operated properly.

(ii) An object's attributes and behaviour is controlled by sending functions to the object.

2. **Why strlen is called pure function?** *[Govt. MQP-2019]*

Ans. (i) strlen is a pure function because the function takes one variable as a parameter, and accesses it to find its length.

(ii) 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.** *[PTA-5]*

Ans. Impure Function has the following side effects

(i) Function impure (has side effect) is that it doesn't take any arguments and it doesn't return any value.

(ii) Function depends on variables or functions outside of its definition block.

(iii) It never assure you that the function will behave the same every time it's called.

For example :

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

(iv) Here, the result of inc() will change every time if the value of 'y' get changed inside the function definition.

(v) Hence, the side effect of inc () function is changing the data of the external variable 'y'.

4. Differentiate pure and impure function.

Ans. *[PTA-3, 6]*

S. No.	Pure	Impure
(i)	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.
(ii)	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.
(iii)	They do not have any side effects.	They have side effects. For example, random(), Date().
(iv)	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.

Ans. 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)
```

Here, the result of inc () will change every time if the value of 'y' get changed inside the function definition. Hence, the side effect of inc () function is changing the data of the external variable 'y'.

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. What are called Parameters and write a note on *[PTA-2]*

(i) Parameter without Type

(ii) Parameter with Type

Ans. **Parameters (and arguments) :** Parameters are the variables in a function definition and arguments are the values which are passed to a function definition.

(i) Parameter without Type : Let us see an example of a function, definition :

```
(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 postcondition **(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.
- In the above function definition if expression can return 1 in the then branch, by the **typing** rule the entire if expression has type **int**.
- Since the if expression has type **'int'**, the function's return type also be 'int'. **'b'** is compared to 0 with the equality operator, so **'b'** is also a type of 'int'. Since 'a' is multiplied with another expression using the * operator, **'a'** must be an int.

(ii) Parameter with Type : Now let us write the same function definition with types for some reason:

```
(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.
- There are times we may want to explicitly write down types. This is useful on times when you get a type error from the compiler that doesn't make sense. Explicitly annotating the types can help with debugging such an error message.

2. Identify in the following program *[PTA-5]*

```
let rec gcd a b :=
if b <> 0 then gcd b (a mod b) else return a
```

i) **Name of the function**
ii) **Identify the statement which tells it is a recursive function**
iii) **Name of the argument variable**
iv) **Statement which invoke the function recursively**
v) **Statement which terminates the recursion**

Ans. (i) gcd
(ii) let rec gcd
(iii) a, b
(iv) gcd b (a mod b)
(v) return a

3. Explain with example Pure and impure functions.

Ans. **Pure functions :**

(i) Pure functions are functions which will give exact result when the same arguments are passed.

(ii) For example the mathematical function sin (0) always results 0. This means that every time you call the function with the same arguments, you will always get the same result.

(iii) A function can be a pure function provided it should not have any external variable which will alter the behaviour of that variable.

Let us see an example

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

(iv) The above function square is a pure function because it will not give different results for same input.

(v) There are various theoretical advantages of having pure functions. One advantage is that 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. Lt's see an example

```
let i: = 0;
  if i <strlen (s) then
  -- Do something which doesn't affect s
  ++i
```

(vi) If it is compiled, strlen (s) is called each time and strlen needs to iterate over the whole of 's'. If the compiler is smart enough to work out that strlen is a pure function and that 's' is not updated in the loop, then it can remove the redundant extra calls to strlen and make the loop to execute only one time.

(vii) From these what we can understand, 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 :

(i) 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.

(ii) 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. For example the mathematical function random() will give different outputs for the same function call.

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

(iii) Here the function Random is impure as it is not sure what will be the result when we call the function.

4. Explain with an example interface and implementation.

Ans. **Interface :**

(i) An interface is a set of action that an object can do. For example when you press a light switch, the light goes on, you may not have cared how it splashed the light. In Object Oriented Programming language, an Interface is a description of all functions that a class must have in order to be a new interface.

(ii) In our example, anything that **"ACTS LIKE"** a light, should have function definitions like turn_on () and a turn_off (). The purpose of interfaces is to allow the computer to enforce the properties of the class of **TYPE T** (whatever the interface is) must have functions called X, Y, Z, etc.

(iii) A class declaration combines the external interface (its local state) with an implementation of that interface (the code that carries out the behaviour). An object is an instance created from the class. The interface defines an object's visibility to the outside world.

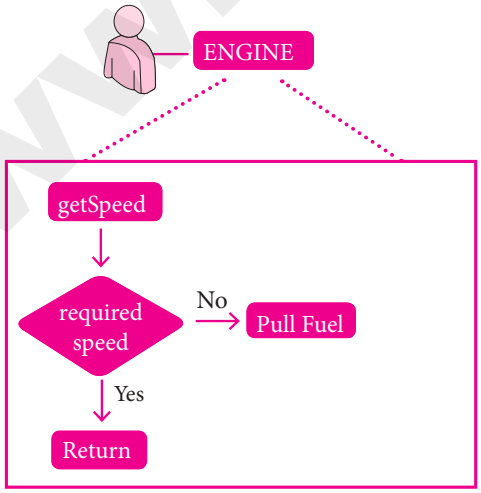
Implementation :

(i) Implementation carries out the instructions defined in the interface.

(ii) How the object is processed and executed is the implementation.

(iii) A class declaration combines the external interface (its local state) with an implementation of that interface (the code that carries out the behaviour).

For example, let's take the example of increasing a car's speed.



(iv) The person who drives the car doesn't care about the internal working. To increase the speed of the car he just presses the accelerator to get the desired behaviour. Here the accelerator is the interface between the driver (the calling / invoking object) and the engine (the called object).

(v) In this case, the function call would be Speed (70): This is the interface. Internally, the engine of the car is doing all the things. It's where fuel, air, pressure, and electricity come together to create the power to move the vehicle.

(vi) All of these actions are separated from the driver, who just wants to go faster. Thus we separate interface from implementation.

HANDS ON PRACTICE

1. Write algorithmic function definition to find the minimum among 3 numbers.

Ans.
```
let min 3 x y z :=
        if x < y then
                if x < z then x else z
        else
                if y < z then y else z
```

2. Write algorithmic recursive function definition to find the sum of n natural numbers.

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

PTA QUESTIONS AND ANSWERS

1 MARK

1. A function definition which call itself : *[PTA-1]*

(a) Pure function (b) Impure function
(c) Normal function
(d) Recursive function

[Ans. (d) Recursive function]

3 MARKS

1. Write a function that finds the minimum of its three arguments. *[PTA-4; QY-2019]*

Ans.
```
let min 3 x y z :=
        if x < y then
                if x < z then x else z
        else
                if y < z then y else z
```

Government Exam Questions and Answers

2 MARKS

1. Define pure function. Give one example. *[QY-2019]*

Ans.
```
let min 3 x y z :=
        if x < y then
            if x < z then x else z
        else
            if y < z then y else z
```

Additional Questions and Answers

Choose the Correct Answer — 1 MARK

1. Which of the following are expressed using statements of a programming language?
(a) Functions (b) Algorithm
(c) Interface (d) Implementation
[Ans. (b) Algorithm]

2. What must the used when a bulk of statements to be repeated for many number of times?
(a) Algorithm (b) Program
(c) Subroutines (d) Parameters
[Ans. (c) Subroutines]

3. Which of the following contains a set a code that works an many kinds of input and produces a concrete output?
(a) Function (b) Algorithm
(c) Arguments (d) Language
[Ans. (a) Function]

4. Which of the following are the values which are passed to a function definition?
(a) Parameters (b) Algorithm
(c) Data types (d) Arguments
[Ans. (d) Arguments]

5. The function definition is introduced by the keyword
(a) def (b) rec
(c) let (d) infer
[Ans. (c) let]

6. The recursive function is defined using the keyword
(a) let (b) let rec
(c) name (d) infer
[Ans. (b) let rec]

7. Which of the following is a description of all functions in object oriented programming language?
(a) Implementation (b) parameter
(c) Interface (d) Arugument
[Ans. (c) Interface]

8. Which of the following is an instance created from the class?
(a) parameter (b) function
(c) subroutines (d) object
[Ans. (d) object]

9. Which of the following is an example of impure function?
(a) Strlen() (b) random()
(c) sqrf() (d) pure()
[Ans. (b) random()]

10. In which type of function the return type is solely depends on its argument passed?
(a) pure (b) impure
(c) parameterized (d) monochromatize
[Ans. (a) pure]

11. In which type of function the return type does not solely depends on its argument passed?
(a) Pure (b) Parameterized
(c) Impure (d) Monochromatize
[Ans. (c) Impure]

Match the following

1. Match the following function definitions with their terms.

let rec odd xy : =

	List I		List II
i)	Keyword	1)	Xy
ii)	Recursion	2)	Odd
iii)	Function name	3)	Rec
iv)	Parameters	4)	let

	(i)	(ii)	(iii)	(iv)
(a)	4	3	2	1
(b)	1	2	3	4
(c)	4	1	2	3
(d)	1	4	2	3

[Ans. (a) (i)-4; (ii)-3; (iii)-2; (iv)-1]

Choose and fill in the blanks

1. Subroutines are called as _____
(a) Algorithm (b) Interface
(c) Parameters (d) Functions
[Ans. (d) Functions]

2. _____ are the variables in a function definition.
(a) Arguments (b) Parameters
(c) Identifiers (d) Operators
[Ans. (b) Parameters]

3. **Explicitly _____ the types can help with debugging.**
(a) defining (b) annotating
(c) informing (d) computing
[Ans. (b) annotating]

4. **All functions are _____ definitions.**
(a) static (b) dynamic
(c) algorithmic (d) static
[Ans. (a) static]

5. **A _____ combines the external interface with an implementation of the interface.**
(a) parameter without type
(b) class declaration
(c) function definition
(d) parameter with type
[Ans. (b) class declaration]

6. **In object oriented programs _____ are the interface**
(a) Implementation (b) parameters
(c) Interface (d) Arguments
[Ans. (c) Interface]

7. **In object oriented programs, how the object is processed and executed is _____.**
(a) Implementation (b) Interface
(c) recursion (d) function
[Ans. (a) Implementation]

8. **Stolen is an example _____function.**
(a) user defined (b) impure
(c) pure (d) recursive
[Ans. (c) pure]

9. **Evaluation of _____ functions does not cause any side effects to its output?**
(a) Impure (b) pure
(c) Recursive (d) built-in
[Ans. (b) pure]

Choose the correct statement

1. (i) Algorithms are not expressed using statements of a programming language.
(ii) An interface is a set of action that an object can do
(iii) Implementation does not carries out the instructions defined in the interface.
(iv) Pure functions will give exact result.
(a) i and iii (b) ii and iv
(c) iii and ii (d) i, ii and iv
[Ans. (a) i and iii]

Very Short Answers **2 MARKS**

1. **Differentiate parameters and arguments.**

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

2. **Give an example of function definition parameter without type.**

Ans.
```
(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)
```

3. **Give an example of function definition parameter with type.**

Ans.
```
(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)
```

4. **What is recursive function?**

Ans. A function definition which call itself is called recursive function.

5. **Give an example of pure function.**

Ans.
```
let square x
        return: x * x
let i: = 0;
        if i <strlen (s) then
        -- Do something which doesn't affect s
        ++i
```

6. **Give an example of impure function.**

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

7. **Construct on algorithm that arranges meetings between these two types so that they change their color to the third type. In the end, all should display the same color.**

Ans.
```
let rec monochromatize a b c :=
if a > 0 then
a, b, c := a-1, b-1, c+2
else
a:=0, b:=0, c:= a + b + c
return c
```

Short Answers 3 MARKS

1. Explain the syntax of function definitions.

Ans. **(i)** The syntax to define functions is close to the mathematical usage: the definition is introduced by the keyword **let**, followed by the **name** of the function and its arguments; then the formula that computes the image of the argument is written after an = sign. If you want to define a recursive function: use **"let rec" instead of "let"**.

(ii) **Syntax :** The syntax for function definitions:

let rec fn a1 a2 ... an := k

(iii) Here the **'fn'** is a variable indicating an identifier being used as a function name. The names **'a1'** to **'an'** are variables indicating the identifiers used as parameters. The keyword **'rec'** is required if **'fn'** is to be a recursive function; otherwise it may be omitted.

2. Write an algorithm to check whether the entered number is even or odd.

Ans. (requires: x>= 0)

```
let rec even x :=
x=0 || odd (x-1)
return 'even'
```

(requires: x>= 0)

```
let odd x :=
x<>0 && even (x-1)
return 'odd'
```

3. Write a short note an syntax for function types.

Ans. **The syntax for function types :**

x → y

x1 → x2 → y

x1 → ... → xn → y

The **'x'** and **'y'** are variables indicating types. The type x → y is the type of a function that gets an input of type 'x' and returns an output of type 'y'. Whereas **x1 → x2 → y** is a type of a function that takes two inputs, the first input is of type **'x1'** and the second input of type **'x2'**, and returns an output of type **'y'**. Likewise **x1 → ... → xn → y** has type **'x'** as input of n arguments and **'y'** type as output.

☆☆☆

CHAPTER 2 DATA ABSTRACTION

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. Which of the following functions that build the abstract data type ?
(a) Constructors (b) Destructors
(c) Recursive (d) Nested
[Ans. (a) Constructors]

2. Which of the following functions that retrieve information from the data type?
(a) Constructors (b) Selectors
(c) Recursive (d) Nested
[Ans. (b) Selectors]

3. The data structure which is a mutable ordered sequence of elements is called
(a) Built in (b) List
(c) Tuple (d) Derived data
[Ans. (b) List]

4. A sequence of immutable objects is called
(a) Built in (b) List
(c) Tuple (d) Derived data
[Ans. (c) Tuple]

5. The data type whose representation is known are called *[PTA-2; QY-2019]*
(a) Built in datatype
(b) Derived datatype
(c) Concrete datatype
(d) Abstract datatype
[Ans. (c) Concrete datatype]

6. The data type whose representation is unknown are called
(a) Built in datatype (b) Derived datatype
(c) Concrete datatype (d) Abstract datatype
[Ans. (d) Abstract datatype]

7. Which of the following is a compound structure?
(a) Pair (b) Triplet
(c) Single (d) Quadrat
[Ans. (a) Pair]

8. **Bundling two values together into one can be considered as** *[Govt. MQP - 2019; PTA-4]*

(a) Pair (b) Triplet
(c) Single (d) Quadrat

[Ans. (a) Pair]

9. **Which of the following allow to name the various parts of a multi-item object?** *[PTA-6]*

(a) Tuples (b) Lists
(c) Classes (d) Quadrats

[Ans. (c) Classes]

10. **Which of the following is constructed by placing expressions within square brackets?**

(a) Tuples (b) Lists
(c) Classes (d) Quadrats

[Ans. (b) Lists]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. **What is abstract data type?**

Ans. (i) 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.

(ii) The definition of ADT only mentions what operations are to be performed but not how these operations will be implemented.

2. **Differentiate constructors and selectors.**

Ans. *[PTA-2, 3; QY-2019]*

S. No.	Constructors	Selectors
(i)	Constructors are functions that build the abstract data type.	Selectors are functions that retrieve information from the data type.
(ii)	Constructors create an object, bundling together different pieces of information.	Selectors extract individual pieces of information from the object

3. **What is a Pair? Give an example.**

Ans. (i) 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.

(ii) **Example :** List = [(10,10), (1,20)]

4. **What is a List? Give an example.** *[QY - 2019]*

Ans. (i) List is constructed by placing expressions within square brackets separated by commas.

(ii) Such an expression is called a list literal. List can store multiple values. Each value can be of any type and can even be another list.

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

5. **What is a Tuple? Give an example.**

Ans. (i) A tuple is a comma-separated sequence of values surrounded with parentheses. Tuple is similar to a list.

(ii) The difference between the two is that you cannot change the elements of a tuple once it is assigned whereas in a list, elements can be changed.

(iii) **Example :** colour= ('red', 'blue', 'Green')

PART - III

ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. **Differentiate Concrete datatype and Abstract datatype.**

Ans.

S. No.	Concrete datatype	Abstract datetype
(i)	Concrete datatypes or structures (CDT's) are direct implementations of a relatively simple concept.	Abstract Datatypes (ADT's) offer a high level view (and use) of a concept independent of its implementation.
(ii)	A concrete data type is a data type whose representation is known.	Abstract data type the representation of a data type is unknown.

2. **Which strategy is used for program designing? Define that Strategy.** *[Govt. MQP-2019]*

Ans. A powerful strategy for designing programs: **'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.

3. Identify Which of the following are constructors and selectors? *[PTA-5]*

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

Ans. (a) Constructors
(b) Selectors
(c) Selectors
(d) Selectors
(e) Constructors
(f) Selectors

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

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

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

(ii) In the above example x will become10 and y will become 20.

(iii) A second method for accessing the elements in a list is by the element selection operator, also expressed using square brackets. Unlike a list literal, a square-brackets expression directly following another expression does not evaluate to a list value, but instead selects an element from the value of the preceding expression.

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

5. 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]

Ans. (a) List
(b) Tuple
(c) Class
(d) Tuple
(e) List
(f) Class

PART - IV

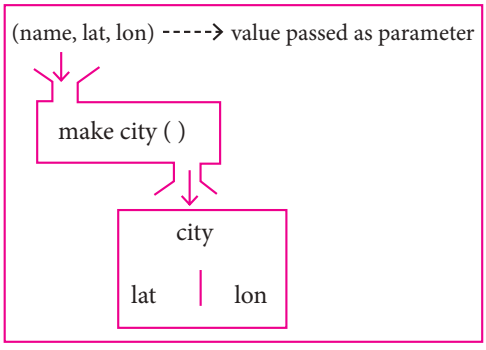
ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. How will you facilitate data abstraction. Explain it with suitable example. *[PTA-2, 4]*

Ans. Data abstraction is supported by defining an abstract data type (ADT), which is a collection of constructors and selectors. To facilitate data abstraction, you will need to create two types of functions: **Constructors, Selectors**

Constructors :

(i) Constructors are functions that build the abstract data type.
(ii) Constructors create an object, bundling together different pieces of information.
(iii) For example, say you have an abstract data type called city.
(iv) This city object will hold the city's name, and its latitude and longitude.
(v) To create a city object, you'd use a function like **city = makecity (name, lat, lon)**.
(vi) Here makecity (name, lat, lon) is the constructor which creates the object city.

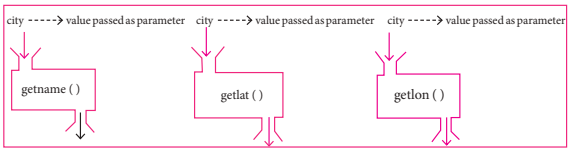


Constructor

Selectors :

(i) Selectors are functions that retrieve information from the data type.
(ii) Selectors extract individual pieces of information from the object.

(iii) To extract the information of a city object, you would used functions like
getname(city)
getlat(city)
getlon(city)
These are the selectors because these functions extract the information of the city object.



2. What is a List? Why List can be called as Pairs. Explain with suitable example. *[PTA-6]*

Ans. **List :**

(i) List is constructed by placing expressions within square brackets separated by commas. Such an expression is called a list literal. List can store multiple values. Each value can be of any type and can even be another list.
Example for List is [10, 20].

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

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

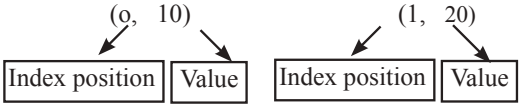
(iii) In the above example x will become10 and y will become 20. A second method for accessing the elements in a list is by the element selection operator, also expressed using square brackets.

(iv) Unlike a list literal, a square-brackets expression directly following another expression does not evaluate to a list value, but instead selects an element from the value of the preceding expression.

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

(v) In both the example mentioned above mathematically we can represent list similar to a set.

lst[(0, 10), (1, 20)] - where



Pair :

(vi) 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.

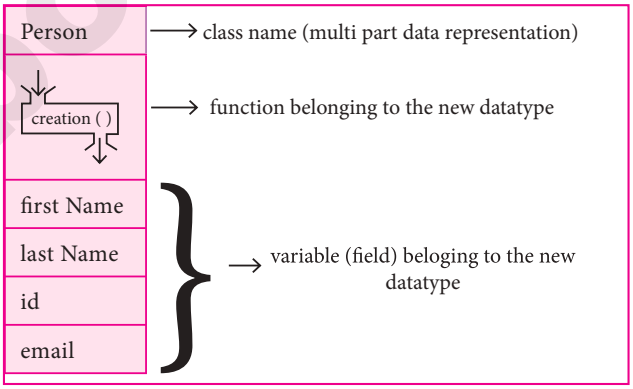
3. How will you access the multi-item? Explain with example.

Ans. (i) The structure construct (In OOP languages it's called class construct) is used to represent multi-part objects where each part is named (given a name). Consider the following pseudo code:

class Person:

```
    creation( )
    firstName := " "
    lastName := " "
    id := " "
    email := " "
```

The new data type Person is pictorially represented as



Let main() contains	
p1:=Person()	statement creates the object
firstName := "Padmashri"	setting a field called first Name with value Padmashri
lastName :="Baskar"	setting a field called lastName with value Baskar
id :="994–222–1234"	setting a field called id value 994–222–1234
email="compsci@gamil.com"	setting a filed called email with value compsci@gmail.com
- - output of firstName : Padmashri	

(ii) The class (structure) construct defines the form for multi-part objects that represent a person.

(iii) Person is referred to as a class or a type, while p1 is referred to as an object or an instance.

(iv) Here class Person as a cookie cutter, and p1 as a particular cookie. Using the cookie cutter you can make many cookies. Same way using class created many objects of that type.

(v) A class defines a data abstraction by grouping related data items. A class is not just data, it has functions defined within it. We say such functions are subordinate to the class because their job is to do things with the data of the class.

PTA Questions and Answers

1 MARK

1. Expansion of ADT : *[PTA-1]*

(a) Abstract Data Tuple
(b) All Data Template
(c) Abstract Data Type
(d) Application Data Type

[Ans. (c) Abstract Data Type]

2. ADT can be implemented using ____. *[PTA-5]*

(a) singly linked list (b) doubly linked list
(c) either A or B (d) neither A nor B

[Ans. (a) singly linked list]

Government Exam Questions and Answers

1 MARK

1. The datatype whose representation is unknown is called *[HY-2019]*

(a) Built-in datatype (b) Derived datatype
(c) Concrete datatype (d) Abstract datatype

[Ans. (d) Abstract datatype]

Additional Questions and Answers

Choose the Correct Answer 1 MARK

1. Which of the following is a powerful concept that allows programmers to treat codes as objects?

(a) Encapsulation (b) Data Abstraction
(c) Inheritance (d) Polymorphism

[Ans. (b) Data Abstraction]

2. Which of the following provides modularity?

(a) Datatypes (b) Subroutines
(c) Classes (d) Abstraction

[Ans. (d) Abstraction]

3. Which of the following is a type for objects whose behavior is defined by a set of value and a set of operations?

(a) User-defined datatype
(b) Derived datatype
(c) Built-in datatype (d) Abstract datatype

[Ans. (d) Abstract datatype]

4. ADT behavior is defined by

(i) Set of Variables (ii) Set of Value
(iii) Set of Functions (iv) Set of Operations
(a) i, ii (b) ii, iii
(c) ii, iv (d) i, iii

[Ans. (c) ii, iv]

5. The process of providing only the essentials and hiding the details is known as

(a) Functions (b) Abstraction
(c) Encapsulation (d) Pairs

[Ans. (b) Abstraction]

6. Which of the following gives an implementation independent view?

(a) Abstract (b) Concrete
(c) Datatype
(d) Behavior of an object

[Ans. (a) Abstract]

7. How many ways to implement an ADT?

(a) Only one (b) Two
(c) Three (d) Many

[Ans. (d) Many]

8. Which of the following are implemented using & lists?

(a) Singly linked list ADT
(b) Doubly Linked list ADT
(c) Stack ADT (d) Queue ADT
(e) All of these **[Ans. (e) All of these]**

9. Which of the following replicate how we think about the world?

(a) Queue ADT (b) Data Hiding
(c) Data Abstraction (d) Stack ADT

[Ans. (c) Data Abstraction]

10. To facilitate data abstraction, How many types of functions are created?
(a) 2 (b) 3
(c) 4 (d) Only one
[Ans. (a) 2]

11. Which of the following function that facilitate the data abstraction?
(a) Constructors (b) Destructors
(c) Selectors (d) a and c
[Ans. (d) a and c]

12. Which of the following are functions that build the abstract datatype?
(a) Constructors (b) Destructors
(c) Selectors (d) All of these
[Ans. (a) Constructors]

13. Which of the following extract the information of the object?
(a) Constructors (b) Functions
(c) Selectors (d) Destructors
[Ans. (c) Selectors]

14. In which data representation, a definition for each function is known.
(a) User defined (b) Buil-in
(c) Abstract (d) Concrete
[Ans. (d) Concrete]

15. How many parts are there in the program?
(a) 2 (b) 3
(c) 4 (d) Many
[Ans. (a) 2]

16. To implement the concrete level of data abstraction the language python provides a compound structure called
(a) ADT (b) Concrete data
(c) Pair
(d) User defined function **[Ans. (c) Pair]**

17. Which of the following is contracted by placing expressions within square brackets separated by commas?
(a) List (b) Tuple
(c) Set (d) Dictionary
[Ans. (a) List]

18. How many values can be stared in the list?
(a) 4 (b) 10
(c) 100 (d) Multiple
[Ans. (d) Multiple]

19. l : = [10, 20] is an example
(a) Tuple (b) Set
(c) List (d) Dictionary
[Ans. (c) List]

20. List can also be called as
(a) Functions (b) Class
(c) Structure (d) Pairs
[Ans. (d) Pairs]

21. How many ways are there to represent pair datatype?
(a) 2 (b) 4 (c) 3 (d) 5
[Ans. (a) 2]

22. Color = ('red', 'green', 'blue') is an example of
(a) Dictionary (b) List
(c) Set (d) Tuple
[Ans. (d) Tuple]

23. Which of the following does not allow us to name the various parts of a multi-item object?
(a) List (b) Tuple
(c) Pair (d) All of these
[Ans. (d) All of these]

24. Which of the following defines a data abstraction by grouping related data items?
(a) List (b) Pair
(c) Class (d) Tuple
[Ans. (c) Class]

25. Which of the following as bundled data and the functions that work on that data?
(a) Object (b) Pair
(c) List (d) Class
[Ans. (d) Class]

26. CDT expansion is
(a) Collective Data Type (b) Class Data Type
(c) Concrete Data Type
(d) Central Data Type
[Ans. (b) Class Data Type]

MATCH THE FOLLOWING

1.		List I		List II
	i)	List	1)	arr (1,2,3,4)
	ii)	Tuples	2)	getname (city)
	iii)	Class	3)	Student [rno, name, mark]
	iv)	Selectors	4)	arr [1,2,3,4]

	(i)	(ii)	(iii)	(iv)
(a)	1	2	3	4
(b)	4	3	2	1
(c)	4	3	2	1
(d)	3	2	4	1

[Ans. (c) (i)-4; (ii)-3; (iii)-2; (iv)-1]

CHOOSE THE ODD MAN OUT

1. (a) List
   (b) Multiple assignment
   (c) Classes
   (d) Element selection operator
   [Ans. (c) Classes]

CHOOSE AND FILL IN THE BLANKS

1. **Data Abstraction allows programmers to treat code as _____.**
   (a) Objects (b) Classes
   (c) Members (d) Parameters
   [Ans. (a) Objects]
2. **_____ are the representation for Abstract Data types.**
   (a) Objects (b) Classes
   (c) Functions (d) Lists
   [Ans. (b) Classes]
3. **Classes are the representation for ____**
   (a) Abstract datatype
   (b) Built-in datatype
   (c) Concrete datatype
   (d) Essential datatype
   [Ans. (a) Abstract datatype]
4. **The _____ can be implemented using singly linked list or doubly linked list.**
   (a) Tuple ADT (b) List ADT
   (c) Function ADT (d) List ADT
   [Ans. (b) List ADT]
5. **The basic idea of ____ is to structure programs so that they operate on abstract dat(a)**
   (a) Encapsulation (b) Polymorphism
   (c) Data type (d) Data Abstraction
   [Ans. (d) Data Abstraction]
6. **A _____ data representation is defined as an independent part of the program.**
   (a) Abstract (b) Concrete
   (c) List (d) Tuple
   [Ans. (b) Concrete]
7. **_____ are functions that retrieve information from the data type.**
   (a) Constructors (b) Selectors
   (c) List (d) Tuples
   [Ans. (b) Selectors]
8. **_____ is made up of list or Tuples.**
   (a) Set (b) Pair
   (c) Dictionary
   (d) Control Structures **[Ans. (b) Pair]**
9. **List is constructed by using ____ and ____.**
   (a) (), , (b) <>, ;
   (c) [], , (d) [], :
   [Ans. (c) [], ,]
10. **A ____ is a comma separated values surround with parentheses.**
    (a) List (b) Tuple
    (c) Set (d) Dictionary
    [Ans. (b) Tuple]
11. **Tuple is constructed by using ___ and __**
    (a) (), (b) [], (c) [],: (d) (),:
    [Ans. (a) (),]
12. **A ____ is not just data, it has functions defined within it.**
    (a) Class (b) List
    (c) Pair (d) Object
    [Ans. (a) Class]

CHOOSE THE INCORRECT STATEMENT

1. (i) ADT is defined by set of values and set of operations
   (ii) ADT does specify how data will be organized in the memory.
   (iii) Constructors are not used to built abstract data type.
   (iv) Selectors are functions that retrieve information from the data type.
   (a) i, ii (b) ii, iv
   (c) ii, iii (d) i, iii, iv
   [Ans. (c) ii, iii]

CHOOSE THE INCORRECT PAIR

1. (a) Abstraction – hiding the details
   (b) Abstract data type–constructor & destructor
   (c) Abstraction – providing only the essentials
   (d) Abstract data type – constructor & selectors
   [Ans. (b) Abstract data type – Constructor & destructor]

VERY SHORT ANSWERS **2 MARKS**

1. **Give an example of implementing an ADT.**

Ans. (i) There can be different ways to implement an ADT, for example, the List ADT can be implemented using singly linked list or doubly linked list.
(i) Similarly, stack ADT and Queue ADT can be implemented using lists.

2. Identify which is the constructor and selector from the following statement.
(i) The Functions that retrieve information from the datatype
(ii) The function which creates an object.

Ans. (i) Selector
(ii) Constructor

3. Write the pseudo code for the representation of the rational number.

Ans. The pseudo code for the representation of the rational number
x,y:=8,3
rational(n,d)
numer(x)/numer(y)
- - output :

4. How the concrete level of data abstraction implemented?

Ans. (i) To implement the concrete level of data abstraction, languages like Python provides a compound structure called Pair which is made up of list or Tuple.
(ii) The first way to implement pairs is with the List construct.

5. Write a note on pair datatype.

Ans. (i) A pair is a compound data type that holds two other pieces of data. The two ways of representing the pair data type.
(ii) The first way is using List construct and the second way to implement pairs is with the tuple construct.

6. Write a pseudocode to depressant rational numbers using list.

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

7. How a class defines a data abstraction?

Ans. (i) A class defines a data abstraction by grouping related data items. A class is not just data, it has functions defined within it.
(ii) Functions are subordinate to the class because their job is to do things with the data of the class.

8. From the statement P1 : = Preson(), What does P1 and person referred.

Ans. Person is referred to as a class or a type, while p1 is referred to as an object or an instance.

9. How the elements of a list can be accessed?

Ans. (i) The elements of a list can be accessed in two ways.
(ii) The first way is via multiple assignment and the second method is by the element selection operator.

SHORT ANSWERS — 3 MARKS

1. Identify the constructor and selector from the following.
(i) City = Make city (name, lat, lon)
(ii) Get name (city)
(iii) Make point (x,y)
(iv) x coord (point)
(v) y coord (point)

Ans. (i) Constructor
(ii) Selector
(iii) Constructor
(iv) Selector
(v) Selector

2. Write a note on Data Abstraction.

Ans. (i) Data abstraction is supported by defining an abstract data type (ADT), which is a collection of constructors and selectors.
(ii) Constructors create an object, bundling together different pieces of information, while selectors extract individual pieces of information from the object.

3. Give an example of an ADT for rational numbers.

Ans. **An ADT for rational numbers :**
- - constructor
- - constructs a rational number with numerator n, denominator d

rational(n, d)
- - selector
numer(x) → returns the numerator of rational number x
denom(y) → returns the denominator of rational number y

LONG ANSWERS — 5 MARKS

1. Explain the representation of Abstract datatype using rational numbers.

Ans. (i) The basic idea of data abstraction is to structure programs so that they operate on abstract data. That is, our programs should use data in such a way, as to make as few assumptions about the data as possible.

(ii) At the same time, a concrete data representation is defined as an independent part of the program.

(iii) Any program consist of two parts. The two parts of a program are, the part that operates on abstract data and the part that defines a concrete representation, is connected by a small set of functions that implement abstract data in terms of the concrete representation.

(iv) To illustrate this technique, let us consider an example to design a set of functions for manipulating rational numbers.

(v) **Example :** A rational number is a ratio of integers, and rational numbers constitute an important sub-class of real numbers. A rational number such as 8/3 or 19/23 is typically written as :

<numerator>/<denominator>

(vi) where both the <numerator> and <denominator> are placeholders for integer values. Both parts are needed to exactly characterize the value of the rational number. Actually dividing integers produces a float approximation, losing the exact precision of integers.

(vii) However, you can create an exact representation for rational numbers by combining together the numerator and denominator.

(viii) As we know from using functional abstractions, we can start programming productively before you have an implementation of some parts of our program.

(ix) Let us begin by assuming that you already have a way of constructing a rational number from a numerator and a denominator. You also assume that, given a rational number, you have a way of selecting its numerator and its denominator component.

☆☆☆

CHAPTER 3

SCOPING

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

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
[Ans. (a) Scope]

2. The process of binding a variable name with an object is called
(a) Scope (b) Mapping
(c) late binding (d) early binding
[Ans. (b) Mapping]

3. Which of the following is used in programming languages to map the variable and object? *[PTA-2; HY-2019]*
(a) :: (b) := (c) = (d) ==
[Ans. (c) =]

4. Containers for mapping names of variables to objects is called *[QY-2019]*
(a) Scope (b) Mapping
(c) Binding (d) Namespaces
[Ans. (d) Namespaces]

5. Which scope refers to variables defined in current function?
(a) Local Scope (b) Global scope
(c) Module scope (d) Function Scope
[Ans. (a) Local 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
[Ans. (b) Modular 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
[Ans. (c) Access control]

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
[Ans. (d) Private members]

9. Which members are accessible from outside the class?

(a) Public members
(b) Protected members
(c) Secured members
(d) Private members

[Ans. (a) Public members]

10. The members that are accessible from within the class and are also available to its sub-classes is called *[PTA-6]*

(a) Public members
(b) Protected members
(c) Secured members
(d) Private members

[Ans. (b) Protected members]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. What is a scope?

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

2. Why scope should be used for variable. State the reason.

Ans. Essentially, variables are addresses (references, or pointers), to an object in memory. When you assign a variable with := to an instance (object), you're binding (or mapping) the variable to that instance. Multiple variable can be mapped to the same instance.

3. What is Mapping? *[PTA-5]*

Ans. The process of binding a variable name with an object is called mapping.= (equal to sign) is used in programming languages to map the variable and object.

4. What do you mean by Namespaces? *[Govt. MQP-2019; PTA-4]*

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

Example : a : = 5

Here the variable 'a' is mapped to the value '5'.

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

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

PART - III

ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. Define Local scope with an example.

Ans. (i) Local scope refers to variables defined in current function. Always, a function will first look up for a variable name in its local scope.

(ii) Only if it does not find it there, the outer scopes are checked.

(iii) Look at this example :

1. Disp(): 2. a:=7 3. print a 4. Disp()	Entire program Disp( ): a:=7 print a Disp ( )	Output of the Program 7

(iv) On execution of the above code the variable a displays the value 7, because it is defined and available in the local scope.

2. Define Global scope with an example. *[PTA-6]*

Ans. (i) A variable which is declared outside of all the functions in a program is known as Global variable.

(ii) This means, global variable can be accessed inside or outside of all the functions in a program. Consider the following example

1. a:=10 2. Disp(): 3. a:=7 4. print a 5. Disp() 6. print a	Entire program a:=10 Disp( ) a:=7 print a Disp 1( ): print a	Output of the Program 7 10

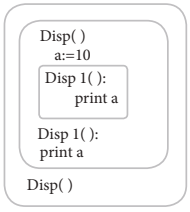
(iii) On execution of the above code the variable a which is defined inside the function displays the value 7 for the function call Disp() and then it displays 10, because a is defined in global scope.

3. Define Enclosed scope with an example. *[PTA-3]*

Ans. **(i)** All programming languages permit functions to be nested. A function (method) within another function is called nested function.

(ii) 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. This scope is called enclosed scope.

(iii) When a compiler or interpreter search for a variable in a program, it first search Local, and then search Enclosing scopes. Consider the following example

1. Disp(): 2. a:=10 3. Disp1(): 4. print a 5. Disp1() 6. print a 7. Disp()	Entire program 	Output of the Program 10 10

4. Why access control is required? *[PTA-1; HY-2019]*

Ans. **(i)** Access control is a security technique that regulates who or what can view or use resources in a computing environment.

(ii) It is a fundamental concept in security that minimizes risk to the object.

(iii) In other words access control is a selective restriction of access to data.

(iv) In oops Access control is implemented through access modifiers.

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

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

Ans. **Output :**

Red Blue Green
Red Blue
Red

Scope of Variables :

Variables	Scope
Color:=Red	Global
b:=Blue	Enclosed
G:=Green	Local

PART - IV

ANSWER THE FOLLOWING QUESTIONS

(5 MARKS)

1. Explain the types of scopes for variable or LEGB rule with example. *[PTA-1]*

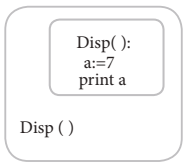
Ans. **Types of Variable Scope :**

There are 4 types of Variable Scope, let's discuss them one by one:

Local Scope :

(i) Local scope refers to variables defined in current function. Always, a function will first look up for a variable name in its local scope. Only if it does not find it there, the outer scopes are checked.

Look at this example

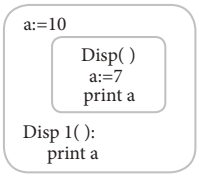
1. Disp(): 2. a:=7 3. print a 4. Disp()	Entire program 	Output of the Program 7

(ii) On execution of the above code the variable a displays the value 7, because it is defined and available in the local scope.

Global Scope:

(i) A variable which is declared outside of all the functions in a program is known as global variable.

(ii) This means, global variable can be accessed inside or outside of all the functions in a program. Consider the following example

1. a:=10 2. Disp(): 3. a:=7 4. print a 5. Disp() 6. print a	Entire program 	Output of the Program 7 10

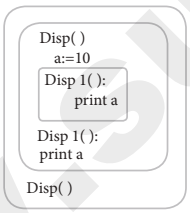
(iii) On execution of the above code the variable 'a' which is defined inside the function displays the value 7 for the function call Disp() and then it displays 10, because a is defined in global scope.

Enclosed Scope :

(i) All programming languages permit functions to be nested. A function (method) with in another function is called nested function.

(ii) 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. This scope is called enclosed scope.

(iii) When a compiler or interpreter search for a variable in a program, it first search Local, and then search Enclosing scopes. Consider the following example

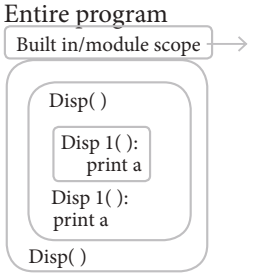
1. Disp(): 2. a:=10 3. Disp1(): 4. print a 5. Disp1() 6. print a 7. Disp()	Entire program 	Output of the Program 10 10

(iv) In the above example Disp1() is defined with in Disp(). The variable 'a' defined in Disp() can be even used by Disp1() because it is also a member of Disp().

Built-in Scope :

(i) The built-in scope has all the names that are pre-loaded into the program scope when we start the compiler or interpreter.

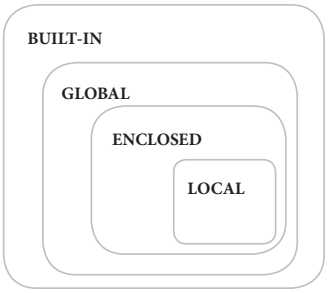
(ii) Any variable or module which is defined in the library functions of a programming language has Built-in or module scope. Consider the following example.

Entire program 	Library files associated with the software

LEGB rule :

The **LEGB** rule is used to decide the order in which the scopes are to be searched for scope resolution. The scopes are listed below in terms of hierarchy (highest to lowest).

Local(L)	Defined inside function/ class
Enclosed(E)	Defined inside enclosing functions (Nested function concept)
Global(G)	Defined at the uppermost level
Built-in(B)	Reserved names in built-in functions (modules)



2. Write any Five Characteristics of Modules. *[PTA-4, 6; HY-2019]*

Ans. The following are the desirable characteristics of a module.

(i) Modules contain instructions, processing logic, and data.

(ii) Modules can be separately compiled and stored in a library.

(iii) Modules can be included in a program.

(iv) Module segments can be used by invoking a name and some parameters.

(v) Module segments can be used by other modules.

3. Write any five benefits in using modular programming. *[Govt. MQP-2019]*

Ans. **(i)** Less code to be written.

(ii) A single procedure can be developed for reuse, eliminating the need to retype the code many times.

(iii) Programs can be designed more easily because a small team deals with only a small part of the entire code.

(iv) Modular programming allows many programmers to collaborate on the same application.

(v) The code is stored across multiple files.

(vi) Code is short, simple and easy to understand.

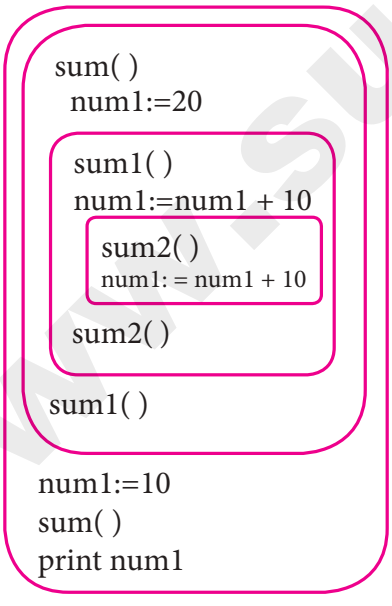
(vii) Errors can easily be identified, as they are localized to a subroutine or function.

(viii) The same code can be used in many applications.

(ix) The scoping of variables can easily be controlled.

HANDS ON PRACTICE

1. Observe the following diagram and Write the pseudo code for the following.



Ans.
```
sum():
    num 1:=20
      sum1()
        num1:= num1 + 10
          sum2()
            num1:= num1 + 10
          sum2()
        sum1()
        num1:= 10
        sum()
        Print num 1
```

PTA QUESTIONS AND ANSWERS

1 MARK

1. A variable which is declared inside a function which contains another function definition : *[PTA-1]*

(a) Local (b) Global
(c) Enclosed (d) Built-in

[Ans. (c) Enclosed]

2. Which are loaded as soon as the library files are imported to the program? *[PTA-3]*

(a) Built-in scope variables
(b) Enclosed scope variables
(c) Global scope variables
(d) Local scope variables

[Ans. (a) Built-in scope variables]

3. Which of the following is not the example of modules? *[PTA-5]*

(a) procedures (b) subroutines
(c) class (d) functions

[Ans. (c) class]

2 MARKS

1. What are modules? *[PTA-4]*

Ans. A module is a part of a program. Programs are composed of one or more independently developed modules.

GOVERNMENT EXAM QUESTIONS AND ANSWERS

1 MARK

1. The kind of scope of the variable 'a' used in the pseudo code given below. *[Govt. MQP-2019]*

(a) Disp(): (b) a: = 7
(c) print a (d) Disp()
(a) Local (b) Global
(c) Enclosed (d) Built-in

[Ans. (a) Local]

2. The SQL command to make a database as current active database is *[Govt. MQP-2019]*

(a) CURRENT (b) USE
(c) DATABASE (d) NEW

[Ans. (b) USE]

2 MARKS

1. What is LEGB rule? *[QY-2019]*

Ans. Scope also defines the order in which variables have to be mapped to the object in order to obtain the value.

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. The part of a program that can see or use the variables are called

(a) Scope (b) Parameter
(c) Function (d) Indentation

[Ans. (a) Scope]

2. Which of the following refers to the addresses to an object in memory?

(a) Functions (b) Indentation
(c) Variables (d) Operators

[Ans. (b) Indentation]

3. How many variables can be mapped to the same instance?

(a) 2 (b) 3
(c) 4 (d) Multiple

[Ans. (d) Multiple]

4. Which of the following keeps track of all these mappings with namespaces?

(a) Programming languages
(b) Application software
(c) System software
(d) My SQL

[Ans. (a) Programming languages]

5. How the names are mapped with objects in programming language?

(a) name == object (b) name :: object
(c) name := object (d) object := name

[Ans. (c) name := object]

6. The order in which variables have to be mapped to the object in order to obtain the value is called

(a) Rule (b) Syntax
(c) Scope (d) Hierarchy

[Ans. (c) Scope]

7. Which of the following rule is used to decide the order in which the scopes are to be searched for scope resolution?

(a) LEGB (b) LGEB
(c) LBEG (d) LGBE

[Ans. (a) LEGB]

8. Write the below interns of hierarchy (highest to lowest)?

(1) Reversed names in built in functions
(2) Defined inside function
(3) Defined inside enclosing function
(4) Defined at the uppermost level

(a) 3, 2, 1, 4 (b) 1, 4, 2, 3
(c) 2, 3, 1, 4 (d) 2, 3, 4, 1

[Ans. (d) 2, 3, 4, 1]

9. How many types of variable scope are there?

(a) 2 (b) 4 (c) 3 (d) 6

[Ans. (b) 4]

10. Which of the following is not a variable scope?

(a) Global (b) Enclosed
(c) List (d) Built-in

[Ans. (c) List]

11. Choose the type of scope for a variable 'a' defined in the following program.

```
Disp () :
a : = 7
Print a
Disp ()
```

(a) Global (b) Enclosed
(c) Local (d) Built-in

[Ans. (c) Local]

12. A variable which is declared outside all the functions in a program is known as

(a) Local (b) Enclosed
(c) Extern (d) Global

[Ans. (d) Global]

13. Which of the following variable can be accessed inside or outside of all the functions in a program?
(a) Local (b) Global
(c) Enclosed (d) Built-in
[Ans. (b) Global]

14. What is the output of the statement in the following program?

```
X : = 10
Disp () :
a : = 7
print a
Displ () :
Print a
```

(a) 710 (b) 107 (c) 7 (d) 10
[Ans. (d) 10]

15. Which of the following can ease the job of programming and debugging the program?
(a) Statements (b) Interaction
(c) Modules (d) Scopes
[Ans. (c) Modules]

16. Which of the following programming enables programmers to divide up the work and retry pieces of the program independently?
(a) Modular Programming
(b) Procedural Programming
(c) Object Oriented Programming
(d) Structural Programming
[Ans. (a) Modular Programming]

17. The example of modules are
(a) Procedures (b) Subroutines
(c) Functions (d) All of these
[Ans. (d) All of these]

18. Which of the following contain instructions, processing logic and data?
(a) Scopes (b) Modules
(c) Indentation (d) Access control
[Ans. (b) Modules]

19. The following are the type of variable scopes Find the odd one out
(a) Local (b) Enclosed
(c) Global (d) Protected
[Ans. (d) Protected]

20. Which of the following members of a class are denied access from outside the class?
(a) Private (b) Protected
(c) Public (d) Enclosed
[Ans. (a) Private]

21. Which of the following is not a classical object oriented language?
(a) C++ (b) Java
(c) Python (d) C [Ans. (d) C]

22. Which of the following keywords are not used to control the access to class members?
(a) Public (b) Protected
(c) Public (d) Global
[Ans. (d) Global]

23. How many access control keywords are there?
(a) 2 (b) 3 (c) 4 (d) 6
[Ans. (b) 3]

24. Find the odd man out
(a) Public (b) Local
(c) Protected (d) Private
[Ans. (b) Local]

25. The arrangement of private instance variables and public methods ensures the principle of
(a) Inheritance (b) Polymorphism
(c) Encapsulation (d) Abstraction
[Ans. (c) Encapsulation]

26. Which of the following members of a class are accessible from within the class and available to its subclass?
(a) Private (b) Protected
(c) Public (d) All of these
[Ans. (b) Protected]

27. By default, the Python. class members are
(a) Private (b) Protected
(c) Global (d) Public
[Ans. (d) Public]

28. By default, the C++ and Java class members are
(a) Private (b) Protected
(c) Public (d) Local
[Ans. (a) Private]

29. **Programs are composed of one or more independently developed**

(a) Access control (b) Encapsulation
(c) Modules
(d) Members of a class **[Ans. (c) Modules]**

MATCH THE FOLLOWING

1.		List I		List II
	i)	Scope	1)	Mapping names
	ii)	Name spaces	2)	Visibility of variables
	iii)	Module	3)	Security technique
	iv)	Access control	4)	Sub dividing program

	(i)	(ii)	(iii)	(iv)
(a)	2	1	4	3
(b)	3	1	4	2
(c)	2	4	1	3
(d)	3	2	4	1

[Ans. (a) (i)-2; (ii)-1; (iii)-4; (iv)-3]

CHOOSE AND FILL IN THE BLANKS

1. **Scope refers to the visibility of _____**

(a) Variables (b) Parameters
(c) Functions (d) All of these
[Ans. (d) All of these]

2. **The duration for which a variable is alive is called its _____.**

(a) End time (b) Life time
(c) Scope time (d) Visible time
[Ans. (b) Life time]

3. **The scope of a _____ is that part of the code where it is visible.**

(a) Keyword (b) Variable
(c) Function (d) Operator
[Ans. (b) Variable]

4. **A Function always first look up for a variable name in its _____ scope.**

(a) Local (b) Enclosed
(c) Global (d) Built-in
[Ans. (a) Local]

5. **The inner function can access the variable of the outer function. This is called _____ scope.**

(a) Local (b) Function
(c) Enclosed (d) Global
[Ans. (c) Enclosed]

6. **_____ can be separately compiled and stored in a library.**

(a) Characteristics (b) Syntax
(c) Modules (d) none of these
[Ans. (c) Modules]

7. **In Object Oriented Programming Language security is implanted through _____**

(a) Access modifiers (b) Access modules
(c) Access variables (d) Keywords
[Ans. (a) Access modifiers]

8. **_____ is a selective restriction of access to data in a program?**

(a) Control variable
(b) System authentication
(c) Access control (d) Modules
[Ans. (c) Access control]

9. **_____ members of the class are accessible from outside the class.**

(a) Private (b) Protected
(c) Public (d) All of these
[Ans. (c) Public]

CONSIDER THE FOLLOWING STATEMENT

1. **Assertion :** The fundamental concept of access control is that minimizes risk to the object.

Reason : Access control is a security technique that regulates who or what can view or use resources in computing environment.

(a) A & R is Fales
(b) A is True but R is False
(c) A is False but R is True
(d) A & R is True **[Ans. (d) A & R is True]**

CHOOSE THE CORRECT STATEMENT

1. (i) A Program cannot be divided into modules that work together to get the output.

(ii) Modules can be separately compiled and stored in a library.

(iii) Procedure, subroutines and functions are not examples of modules.

(iv) Modules contain instructions, logic and data

(a) i and ii (b) ii and iii
(c) iii and iv (d) ii and iv
[Ans. (d) ii and iv]

Choose the incorrect statement

1. (i) There a different types of variable scope
(ii) Enclosed and extended are the type of variable scope
(iii) A variable is declared outside of all the function is called global variable
(iv) Built-in Scope is also called Module scope.
(a) i, iii and iv (b) ii and iii
(c) i and ii (d) iii only
[Ans. (c) i and ii]

Very Short Answers 2 MARKS

1. Define variable.

Ans. Variable are addresses (references, or pointers), to an object in memory.

2. What is the use of LEGB rule?

Ans. The LEGB rule is used to decide the order in which the scopes are to be searched for scope resolution. The scopes are listed below in terms of hierarchy (highest to lowest).

3. Name the types of variable scope.

Ans. (i) Local scope
(ii) Enclosed scope
(iii) Global scope
(iv) Built-in scope.

4. What is modular programming?

Ans. The process of subdividing a computer program into separate sub-programs is called modular programming.

Short Answers 3 MARKS

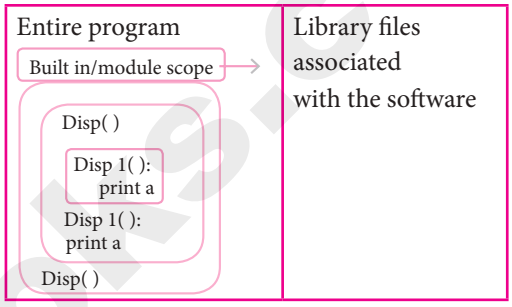
1. How the changes inside the function can't affect the variable on the outside of the function in unexpected ways?

Ans. (i) Every variable defined in a program has global scope.
(ii) Once defined, every part of your program can access that variable. But it is a good practice to limit a variable's scope to a single definition.
(iii) This way, changes inside the function can't affect the variable on the outside of the function in unexpected ways.

2. Write a note on built-in scope.

Ans. (i) Built-in scope is the widest scope. The built-in scope has all the names that are pre-loaded into the program scope when we start the compiler or interpreter.

(ii) 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.



(iii) Normally only Functions or modules come along with the software, as packages, therefore they will come under Built in scope.

3. Write a note on module.

Ans. (i) A module is a part of a program. Programs are composed of one or more independently developed modules. A single module can contain one or several statements closely related each other.

(ii) Modules work perfectly on individual level and can be integrated with other modules. A software program can be divided into modules to ease the job of programming and debugging as well.

(iii) A program can be divided into small functional modules that work together to get the output. The process of subdividing a computer program into separate sub-programs is called Modular programming.

(iv) Modular programming enables programmers to divide up the work and debug pieces of the program independently. The examples of modules are procedures, subroutines, and functions.

4. How will you ensure the principle of data encapsulation in object – oriented programming?

Ans. Public members (generally methods declared in a class) are accessible from outside the class. The object of the same class is required to invoke a public method. This arrangement of private instance variables and public methods ensures the principle of data encapsulation.

5. Write a note on access modifiers of a class.

Ans.

(i) Public members (generally methods declared in a class) are accessible from outside the class.

(ii) Protected members of a class are accessible from within the class and are also available to its sub-classes.

(iii) Private members of a class are denied access from outside the class. They can be handled only from within the class.

6. Write a short note on types of variable scope.

Ans.

(i) Public members (generally methods declared in a class) are accessible from outside the class.

(ii) A variable which is declared outside of all the functions in a program is known as global variable.

(iii) 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. This scope is called enclosed scope.

(iv) Built-in scope the widest scope has all the names that are pre-loaded into program scope when we start the compiler or interpreter.

Long Answers 5 MARKS

1. Explain the concept access control.

Ans.

(i) Access control is a security technique that regulates who or what can view or use resources in a computing environment.

(ii) It is a fundamental concept in security that minimizes risk to the object.

(iii) In other words access control is a selective restriction of access to data. IN Object oriented programming languages it is implemented through access modifiers.

(iv) Classical object-oriented languages, such as C++ and Java, control the access to class members by public, private and protected keywords.

(v) Private members of a class are denied access from the outside the class. They can be handled only from within the class.

(vi) Public members (generally methods declared in a class) are accessible from outside the class. The object of the same class is required to invoke a public method. This arrangement of private instance variables and public methods ensures the principle of data encapsulation.

(vii) Protected members of a class are accessible from within the class and are also available to its sub-classes. No other process is permitted access to it. This enables specific resources of the parent class to be inherited by the child class.

(viii) Python doesn't have any mechanism that effectively restricts access to any instance variable or method. Python prescribes a convention of prefixing the name of the variable or method with single or double underscore to emulate the behaviour of protected and private access specifiers.

(ix) All members in a Python class are public by default, whereas by default in C++ and java they are private. Any member can be accessed from outside the class environment in Python which is not possible in C++ and java.

☆☆☆

CHAPTER 4

ALGORITHMIC STRATEGIES

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. The word comes from the name of a Persian mathematician Abu Ja'far Mohammed ibn-i Musa al Khowarizmi is called? *[PTA-6]*

(a) Flowchart (b) Flow
(c) Algorithm (d) Syntax

[Ans. (c) Algorithm]

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

[Ans. (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

[Ans. (c) Time 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)

[Ans. (a) O(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

[Ans. (c) Merge sort]

6. Which of the following is not a stable sorting algorithm?

(a) Insertion sort (b) Selection sort
(c) Bubble sort (d) Merge sort

[Ans. (b) Selection sort]

7. Time complexity of bubble sort in best case is *[PTA-1]*

(a) θ (n) (b) θ (nlogn)
(c) θ (n2) (d) θ (n(logn) 2)

[Ans. (a) θ (n)]

8. The Θ notation in asymptotic evaluation represents

(a) Base case (b) Average case
(c) Worst case (d) NULL case

[Ans. (b) Average 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

[Ans. (a) Overlapping subporblems]

10. In dynamic programming, the technique of storing the previously calculated values is called ? *[HY-2019]*

(a) Saving value property
(b) Storing value property
(c) Memoization
(d) Mapping **[Ans. (c) Memoization]**

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. What is an Algorithm?

Ans. 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.

2. Define Pseudo code.

Ans.
(i) Pseudo code is an informal high level description of the operations principle of a computer program or other algorithm.
(ii) It uses the structural conventions of a normal programming language, but is intended for human reading rather than machine reading.

3. Who is an Algorist?

Ans. Algorist may refer to
(i) A person skilled in the technique of performing basic decimal arithmetic, known as algorism.
(ii) A person skilled in the design of algorithms.
(iii) An Algorithmic artist.

4. What is Sorting?

Ans. Sorting is any process of arranging information or data in an ordered sequence either in ascending or descending order. Various sorting techniques in algorithms are Bubble sort, Quick sort, Heap sort, Selection sort, Insertion sort.

5. What is searching? Write its types.

[Govt. MQP-2019; HY-2019]

Ans. A searching algorithm is the step-by-step procedure used to locate specific data among a collection of data. There are two type of searching are

(i) Linear Search

(ii) Binary Search

PART - III

ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. List the characteristics of an algorithm.

Ans. (i) Input

(ii) Output

(iii) Finiteness

(iv) Definiteness

(v) Effectiveness

(vi) Correctness

(vii) Simplicity

(viii) Unambiguous

(ix) Feasibility

(x) Portable

(xi) Independent

2. Discuss about Algorithmic complexity and its types. *[PTA-1]*

Ans. 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.

(i) **Time Complexity :** The Time complexity of an algorithm is given by the number of steps taken by the algorithm to complete the process.

(ii) **Space Complexity :** Space complexity of an algorithm is the amount of memory required to run to its completion.

3. What are the factors that influence time and space complexity?

Ans. (i) **Time Factor** -Time is measured by counting the number of key operations like comparisons in the sorting algorithm.

(ii) **Space Factor** - Space is measured by the maximum memory space required by the algorithm.

4. Write a note on Asymptotic notation.

[QY-2019]

Ans. Asymptotic Notations are languages that uses meaningful statements about time and space complexity. The following three asymptotic notations are mostly used to represent time complexity of algorithms:

(i) **Big O :** Big O is often used to describe the worst-case of an algorithm.

(ii) **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).

(iii) **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.

5. What do you understand by Dynamic programming?

Ans. (i) 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.

(ii) Dynamic programming approach is similar to divide and conquer. The given problem is divided into smaller and yet smaller possible sub-problems.

(iii) 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.

(iv) 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.

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. Explain the characteristics of an algorithm.

Ans. *[PTA-5; HY-2019]*

Input	Zero or more quantities to be supplied.
Output	At least one quantity is produced.
Finiteness	Algorithms must terminate after finite number of steps.
Definiteness	All operations should be well defined. For example operations involving division by zero or taking square root for negative number are unacceptable.
Effectiveness	Every instruction must be carried out effectively.
Correctness	The algorithms should be error free.
Simplicity	East to implement.
Unambiguous	Algorithm should be clear and unambiguous. Each of its steps and their inputs/outputs should be clear and must lead to only one meaning.
Feasibility	Should be feasible with the available resources.
Portable	An algorithm should be generic, independent of any programming language or an operating system able to handle all range of inputs.
Independent	An algorithm should have step-by-step directions, which should be independent of any programming code.

2. Discuss about Linear search algorithm.

[PTA-1]

Ans.

(i) Linear search also called sequential search is a sequential method for finding a particular value in a list.

(ii) 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 :

(i) Traverse the array using for loop

(ii) 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.

(iii) If no match is found, display the search element not found.

Example

To search the number 25 in the array given below, linear search will go step by step in a sequential order starting from the first element in the given array if the search element is found that index is returned otherwise the search is continued till the last index of the array. In this example number 25 is found at index number 3.

index	0	1	2	3	4
values	10	12	20	25	30

Example 1 :

Input: values[] = {5, 34, 65, 12, 77, 35}

target = 77

Output: 4

Example 2:

Input: values[] = {101, 392, 1, 54, 32, 22, 90, 93}

target = 200

Output: -1 (not found)

3. What is Binary search? Discuss with example.

Ans. **Binary search :** 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 for Binary search :

Start with the middle element:

(i) 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.

(ii) If not, then compare the middle element with the search value,

(iii) 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.

(iv) 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.

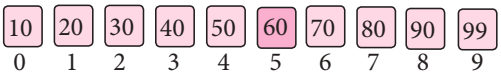
(v) When a match is found, display success message with the index of the element matched.

(vi) If no match is found for all comparisons, then display unsuccessful message.

Binary Search Working principles :

(i) List of elements in an array must be sorted first for Binary search. The following example describes the step by step operation of binary search.

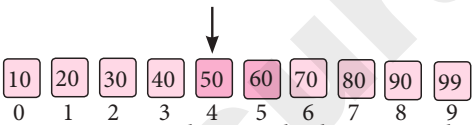
(ii) Consider the following array of elements, the array is being sorted so it enables to do the binary search algorithm. Let us assume that the search element is 60 and we need to search the location or index of search element 60 using binary search.



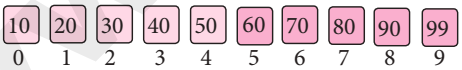
(iii) First, we find index of middle element of the array by using this formula :

mid = low + (high - low) / 2

(iv) Here it is, 0 + (9 - 0) / 2 = 4 (fractional part ignored). So, 4 is the mid value of the array.



(v) Now compare the search element with the value stored at mid value location 4. The value stored at location or index 4 is 50, which is not match with search element. As the search value 60 is greater than 50.

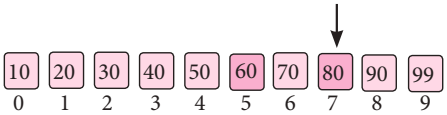


(vi) Now we change our low to mid + 1 and find the new mid value again using the formula.

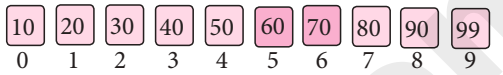
low to mid + 1

mid = low + (high - low) / 2

(vii) Our new mid is 7 now. We compare the value stored at location 7 with our target value 31.



(viii) The value stored at location or index 7 is not a match with search element, rather it is more than what we are looking for. So, the search element must be in the lower part from the current mid value location

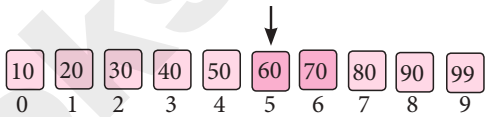


(ix) The search element still not found. Hence, we calculated the mid again by using the formula.

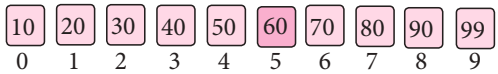
high = mid -1

mid = low + (high - low)/2

Now the mid value is 5.



(x) Now we compare the value stored at location 5 with our search element. We found that it is a match.



(xi) We can conclude that the search element 60 is found at location or index 5. For example if we take the search element as 95, For this value this binary search algorithm return unsuccessful result.

4. Explain the Bubble sort algorithm with example. *[PTA-6]*

Ans. **Bubble sort algorithm:**

(i) 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.

(ii) 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.

(iii) Although the algorithm is simple, it is too slow and less efficient when compared to insertion sort and other sorting methods.

(iv) Assume list is an array of n elements. The swap function swaps the values of the given array elements.

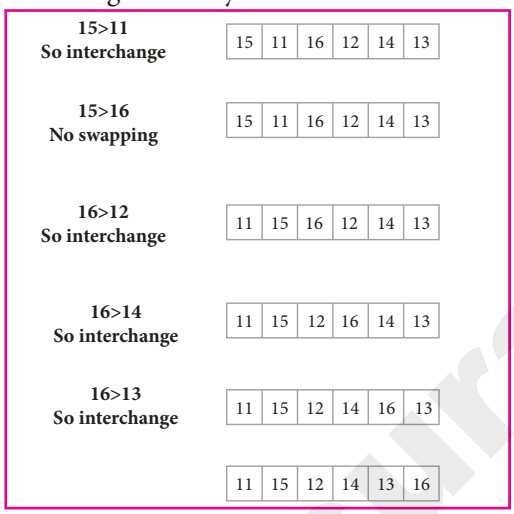
Pseudo code :

(i) Start with the first element i.e., index = 0, compare the current element with the next element of the array.

(ii) If the current element is greater than the next element of the array, swap them.

(iii) 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.

(iv) Let's consider an array with values {15, 11, 16, 12, 14, 13} Below, we have a pictorial representation of how bubble sort will sort the given array.



(v) The above pictorial example is for iteration–1. Similarly, remaining iteration can be done. The final iteration will give the sorted array. At the end of all the iterations we will get the sorted values in an array as given below :

11	12	13	14	15	16

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

(i) 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.

(ii) Dynamic programming approach is similar to divide and conquer. The given problem is divided into smaller and yet smaller possible sub-problems.

(iii) 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.

(iv) 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.

(v) The solutions of overlapped sub-problems are combined in order to get the better solution.

Steps to do Dynamic programming :

(i) The given problem will be divided into smaller overlapping sub-problems.

(ii) An optimum solution for the given problem can be achieved by using result of smaller sub-problem.

(iii) Dynamic algorithms uses Memoization.

Fibonacci Series – An example :

(i) Fibonacci series generates the subsequent number by adding two previous numbers. Fibonacci series starts from two numbers – Fib 0 & Fib 1. The initial values of Fib 0 & Fib 1 can be taken as 0 and 1.

(ii) Fibonacci series satisfies the following conditions :

$$Fibn = Fib_{n-1} + Fib_{n-2}$$

(iii) Hence, a Fibonacci series for the n value 8 can look like this

$$Fib_8 = 0\ 1\ 1\ 2\ 3\ 5\ 8\ 13$$

Fibonacci Iterative Algorithm with Dynamic programming approach : The following example shows a simple Dynamic programming approach for the generation of Fibonacci series.

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

For example if we generate fibobnacci series upto 10 digits, the algorithm will generate the series as shown below:

The Fibonacci series is : 0 1 1 2 3 5 8 13 21 34 55.

PTA Questions and Answers

1 MARK

1. Step by step procedure for solving a given problem: *[PTA-2]*

(a) Proram (b) Pseudo Code
(c) Flowchart (d) Algorithm

[Ans. (d) Algorithm]

2. Which of the following is not a characteristic of an algorithm? *[PTA-3]*

(a) Input (b) Program
(c) Finiteness (d) Simplicity

[Ans. (b) Program]

3. This is a theoretical performance analysis of an algorithm. *[PTA-4]*

(a) Priori estimates (b) Posteriori testing
(c) Space factor (d) Time factor

[Ans. (a) Priori estimates]

4. Which of the following algorithmic approach is similar to divide and conquer approach? *[PTA-5]*

(a) Insertion sorting
(b) Dynamic programming
(c) Selection searching
(d) Bubble programming

[Ans. (b) Dynamic programming]

3 MARKS

1. Write a pseudo code for bubble sort algorithm. *[PTA-3]*

Ans.
(i) Start with the first element i.e., index = 0, compare the current element with the next element of the array.
(ii) If the current element is greater than the next element of the array, swap them.
(iii) 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.

2. Write the pseudo code for linear search. *[PTA-4]*

Ans.
(i) Traverse the array using 'for loop'
(ii) In every iteration, compare the target search key value with the current value of the list.
(iii) If the values match, display the current index and value of the array
(iv) If the values do not match, move on to the next array element.
(v) If no match is found, display the search element not found.

3. What are the different phases of analysis and performance evaluation of an algorithm? *[PTA-5]*

Ans. Analysis of algorithms and performance evaluation can be divided into two different phases:

(i) **A Priori estimates :** This is a theoretical performance analysis of an algorithm. Efficiency of an algorithm is measured by assuming the external factors.

(ii) **A Posteriori testing :** This is called performance measurement. In this analysis, actual statistics like running time and required for the algorithm executions are collected.

4. What are the factors that measure the execution time of an algorithm? *[PTA-6]*

Ans. The space required by an algorithm is equal to the sum of the following two components:

(i) **A fixed part** is defined as the total space required to store certain data and variables for an algorithm. For example, simple variables and constants used in an algorithm.

(ii) **A variable part** is defined as the total space required by variables, which sizes depends on the problem and its iteration. For example: recursion used to calculate factorial of a given value n.

5 MARKS

1. Explain about Complexity of an algorithm. *[PTA-3]*

Ans. Suppose A is an algorithm and n is the size of input data, the time and space used by the algorithm A are the two main factors, which decide the efficiency of A.

(i) **Time Factor :** Time is measured by counting the number of key operations like comparisons in the sorting algorithm.

(ii) **Space Factor :** Space is measured by the maximum memory space required by the algorithm. 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.

(iii) **Time Complexity :** The Time complexity of an algorithm is given by the number of steps taken by the algorithm to complete the process.

(iv) **Space Complexity :** Space complexity of an algorithm is the amount of memory required to run to its completion. The space required by an algorithm is equal to the sum of the following two components:

- **A fixed part** is defined as the total space required to store certain data and variables for an algorithm. For example, simple variables and constants used in an algorithm.
- **A variable part** is defined as the total space required by variables, which sizes depends on the problem and its iteration. For example: recursion used to calculate factorial of a given value n.

2. Write the pseudo code for selection sort algorithm. *[PTA-4]*

Ans. The selection sort is a simple sorting algorithm that improves on the performance of bubble sort by making only one exchange for every pass through the list.

Pseudo code :

(i) Start from the first element i.e., index-0, we search the smallest element in the array, and replace it with the element in the first position.

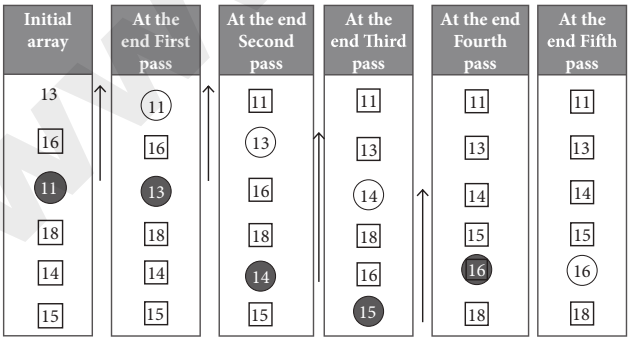
(ii) Now we move on to the second element position, and look for smallest element present in the sub-array, from starting index to till the last index of sub - array.

(iii) Now replace the second smallest identified in step-2 at the second position in the or original array, or also called first position in the sub array.

(iv) This is repeated, until the array is completely sorted.

Let's consider an array with values {13, 16, 11, 18, 14, 15}

Below, we have a pictorial representation of how selection sort will sort the given array.



In the first pass, the smallest element will be 11, so it will be placed at the first position.

(i) After that, next smallest element will be searched from an array. Now we will get 13 as the smallest, so it will be then placed at the second position.

(ii) Then leaving the first element, next smallest element will be searched, from the remaining elements. We will get 13 as the smallest, so it will be then placed at the second position.

(iii) Then leaving 11 and 13 because they are at the correct position, we will search for the next smallest element from the rest of the elements and put it at third position and keep doing this until array is sorted.

Government Exam Questions and Answers

1 MARK

1. Big is Ω the reverse of *[Govt. MQP-2019]*

(a) Big O (b) Big Θ
(c) Big A (d) Big S

[Ans. (a) Big O]

2. What is another name for Binary search? *[QY-2019]*

(a) Linear (b) Half interval
(c) Decimal (d) Boolean

[Ans. (b) Half interval]

5 MARKS

1. Explain the selection Sort Algorithm with an example. *[QY-2019]*

Ans. (i) Let us assume a list of n number of values stored in an array. Suppose if we want to search a particular element in this list, the algorithm that search the key element in the list among n elements, by comparing the key element with each element in the list sequentially.

(ii) The best case would be if the first element in the list matches with the key element to be searched in a list of elements. The efficiency in that case would be expressed as O(1) because only one comparison is enough.

(iii) Similarly, the worst case in this scenario would be if the complete list is searched and the element is found only at the end of the list or is not found in the list. The efficiency of an algorithm in that case would be expressed as O(n) because n comparisons required to complete the search.

(iv) The average case efficiency of an algorithm can be obtained by finding the average number of comparisons as given below:
Minimum number of comparisons = 1
Maximum number of comparisons = n
If the element not found then
maximum number of comparison = n
Therefore, average number
of comparisons = (n + 1)/2

(v) Hence the average case efficiency will be expressed as O (n).

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Which of the following is a finite set of instructions to accomplish a particular task?
(a) Flowchart (b) Functions
(c) Algorithm (d) Abstraction
[Ans. (c) Algorithm]

2. Which of the following are the characteristics of an algorithm?
(i) Definiteness
(ii) Correctness
(iii) Effectiveness
(a) i, ii (b) ii, iii
(c) Only ii (d) i, ii and iii
[Ans. (d) i, ii and iii]

3. Which of the following is not a characteristic of an algorithm?
(a) Definiteness (b) Correctness
(c) Data structure (d) Effectiveness
[Ans. (c) Data structure]

4. Which of the following is not an example of data structures?
(a) Control statement (b) Structure
(c) List (d) Dictionary
[Ans. (a) Control statement]

5. Which of the following is an example of data structures?
(a) List (b) Tuple
(c) Dictionary (d) All of these.
[Ans. (d) All of these]

6. Which of the following is not a type of searching technique?
(i) Linear (ii) Binary
(iii) Selection (iv) Merge
(a) Only i (b) Only ii
(c) Only iii (d) iii and iv
[Ans. (d) iii and iv]

7. Which of the following is not a sorting technique?
(a) Bubble (b) Binary
(c) Insertion (d) Quick
[Ans. (b) Binary]

8. The way of defining an algorithm is called
(a) Pseudo strategy
(b) Programmic strategy
(c) Algorithmic strategy
(d) Data structured strategy
[Ans. (c) Algorithmic strategy]

9. Which characteristics of algorithm defined the operation involving division by zero?
(a) Finiteness (b) Definiteness
(c) Input (d) Correctness
[Ans. (b) Definiteness]

10. Which characteristics of an algorithm should be generic, independent of any programming language?
(a) Independent (b) Portable
(c) Feasibility (d) Unambiguous
[Ans. (b) Portable]

11. Which of the following could be designed to get a solution of a given problem?
(a) Program (b) Algorithm
(c) Flowchart (d) Input/Output
[Ans. (b) Algorithm]

12. An algorithm that yields expected output for a valid input is called an
(a) Algorithmic Solution
(b) Algorithmic Structure
(c) Algorithmic Strategy
(d) Algorithmic Procedure
[Ans. (a) Algorithmic Solution]

13. **Performance measurement of an algorithm is called**
(a) Posteriori testing (b) Priori estimates
(c) Efficiency testing
(d) Algorithmic analysis
[Ans. (a) Posteriori testing]

14. **An estimation of the time and space complexities of an algorithm is called**
(a) Algorithmic solution
(b) Algorithmic Strategy
(c) Algorithmic performance
(d) Algorithmic analysis
[Ans. (d) Algorithmic analysis]

15. **Efficiency of an algorithm decided by**
(a) Time, Space
(b) Definiteness, portability
(c) Priori, Postriori
(d) Input/output **[Ans. (a) Time, Space]**

16. **The number of steps taken by the algorithm to complete the process is known as**
(a) Time complexity of an algorithm
(b) Space complexity of an algorithm
(c) Efficiency of an algorithm
(d) Performance analysis of an algorithm
[Ans. (a) Time complexity of an algorithm]

17. **Which of the following should be written for the selected programming language with specific syntax?**
(a) Algorithm (b) Pseudocode
(c) Process (d) Program
[Ans. (d) Program]

18. **The amount of memory required to run an algorithm completion is known by**
(a) Efficiency of an algorithm
(b) Performance analysis of an algorithm
(c) Space complexity of an algorithm
(d) Time complexity of an algorithm
[Ans. (c) Space complexity of an algorithm]

19. **How many components required to find the space required by an algorithm?**
(a) 4 (b) 3 (c) 6 (d) 2
[Ans. (d) 2]

20. **Which of the following component is defined as the total space required to store certain data and variables for an algorithm?**
(a) Time part (b) Variable part
(c) Fixed part (d) Memory part
[Ans. (c) Fixed part]

21. **Which of the following component is defined as the total space required by variables, which sizes depends on the problem and its iteration?**
(a) Variable part (b) Time part
(c) Fixed part (d) Efficiency part
[Ans. (a) Variable part]

22. **Time and Space complexity could be considered for an**
(a) Algorithmic strategy
(b) Algorithmic analysis
(c) Algorithmic solution
(d) Algorithmic efficiency
[Ans. (d) Algorithmic efficiency]

23. **How many factors are used to measure the time efficiency of an algorithm?**
(a) Two (b) Three
(c) Six (d) Many
[Ans. (d) Many]

24. **Which of the following is not a factor use a to measure the time efficiency of an algorithm?**
(a) Speed of the machine
(b) Operating system
(c) Designing algorithm
(d) Programming language
(e) Volume of data required
[Ans. (c) Designing algorithm]

25. **How many asymptotic notations are mostly used to represent time complexity of algorithms?**
(a) Three (b) Two
(c) One (d) Many
[Ans. (a) Three]

26. **Which of the following notation is often used to describe the worst-case fan algorithm?**
(a) Big Ω (b) Big μ
(c) Big O (d) Big α
[Ans. (c) Big O]

27. Which of the following is the reverse of Big O?
(a) Big Ω (b) Big μ
(c) Big symbol (d) Big b
[Ans. (a) Big Ω]

28. 0(1) is an example of
(a) best case (b) worst case
(c) Average case (d) Null casd
[Ans. (a) best case]

29. 0(n) is an example of
(a) best case (b) Average case
(c) worst case (d) Null case
[Ans. (c) worst case]

30. Linear search is also called
(a) Sequential search (b) Quick search
(c) Binary search (d) Selection search
[Ans. (a) Sequential search]

31. Which of the following method checks the search element with each element in sequence?
(a) Bubble search (b) Binary search
(c) Linear search (d) None of these
[Ans. (c) Linear search]

32. Binary search also called
(a) Sequential search
(b) Half-interval search
(c) Unordered search
(d) Full-interval search
[Ans. (b) Half-interval search]

33. Which of the following algorithm finds the position of a search element within a sorted array?
(a) Binary search (b) Linear search
(c) Sequential search (d) List search
[Ans. (a) Binary search]

34. Which search algorithm can be done as divided and conjurer search algorithm?
(a) Half-interval (b) linear
(c) Sequential (d) Bubble
[Ans. (a) Half-interval]

35. Which of the following search algorithm executes in logarithmic time?
(a) Linear (b) Sequential
(c) Binary (d) Half-interval
(e) c or d [Ans. (e) c or d]

36. Bubble sort is also called
(a) Sequential sort
(b) Quick sort
(c) Half-interval sort
(d) Comparison sort
[Ans. (d) Comparison sort]

37. Which of the following sorting algorithm is too slow and less efficient?
(a) Bubble (b) Selection
(c) Quick (d) Merge
[Ans. (a) Bubble]

38. Which sorting algorithm compares each pair of adjacent elements and swaps them if they are in the unsorted order?
(a) Selection (b) Merge
(c) Insertion (d) None of these
[Ans. (d) None of these]

39. Which sorting algorithm sort is by making only one exchange for every pass through the list?
(a) Bubble (b) Selection
(c) Comparison (d) Merge
[Ans. (b) Selection]

40. Which sorting algorithm repeatedly selects the next smallest element and swaps in into the right place for every pass?
(a) Bubble sort (b) Sequential sort
(c) Selection sort (d) Heap sort
[Ans. (c) Selection sort]

41. Which sorting techniques working by taking elements from the list one by one and inserting them in their correct position into a new sorted list?
(a) Bubble (b) Selection
(c) Merge (d) Insertion
[Ans. (d) Insertion]

42. Which of the following programming is used whenever problems can be divided into similar sub-problems?
(a) Dynamic (b) Object oriented
(c) Modular (d) Procedural
[Ans. (a) Dynamic]

43. In which programming the solutions of overlapped sub-problems are combined in order to get the better solution?
(a) Object oriented (b) Procedural
(c) Dynamic (d) Modular
[Ans. (c) Dynamic]

44. Which of the following algorithm used memorization?
(a) Efficient (b) Dynamic
(c) Effective (d) Modular
[Ans. (b) Dynamic]

45. Which of the following optimization technique used in dynamic algorithms.
(a) Memorization
(b) Composition
(c) Specification
(d) Decomposition **[Ans. (a) Memorization]**

Choose and fill in the blanks

1. Data are maintained and manipulated effectively through _____.
(a) Algorithm (b) Data Structures
(c) Pseudocode (d) Program
[Ans. (b) Data Structures]

2. Each of algorithm steps and there inputs/outputs should be clear and must lead to only one meaning refers to the algorithm characteristics _____.
(a) Unambiguous (b) Feasibility
(c) Independent (d) Effectiveness
[Ans. (a) Unambiguous]

3. Algorithm resembles a _____ which can be implemented in any programming language.
(a) Solution (b) Program
(c) Pseudocode (d) Function
[Ans. (c) Pseudocode]

4. Performance evaluation of an algorithm can be divided into _____ different phases.
(a) 3 (b) 4 (c) 2 (d) 1
[Ans. (c) 2]

5. Efficiency of an algorithm is measured by ___ factors.
(a) 3 (b) 4 (c) 2 (d) 1
[Ans. (c) 2]

6. Space required by an algorithm = Fixed part + _____
(a) Constant part (b) Variable part
(c) Time part (d) Second part
[Ans. (b) Variable part]

7. Recursion used to calculate factorial of a given value *n* in algorithm is an example of _____ component
(a) Fixed part (b) Variable part
(c) Operator part (d) Time part
[Ans. (b) Variable part]

8. Simple variables and constants used in an algorithm is an example of _____ component.
(a) Time part (b) Variable part
(c) Factor part (d) Fixed part
[Ans. (d) Fixed part]

9. The ____ of an algorithm is defined as the number of computational resources used by the algorithm.
(a) Simplicity (b) Efficiency
(c) Feasibility (d) Potable
[Ans. (b) Efficiency]

10. _____ are languages that uses meaningful statements about time and space complexity?
(a) Time and space trade
(b) Asymptotic notations
(c) Complexity notations
(d) Algorithmic notations
[Ans. (b) Asymptotic notations]

11. _____ is used to describe the upper bound of a asymptotic function.
(a) Big μ (b) Big O
(c) Big Ω (d) Big β
[Ans. (b) Big O]

12. _____ is used to describe the lower bound of asymptotic function.
(a) Big Alpha (b) Big Beta
(c) Big O (d) Big Omega
[Ans. (d) Big Omega]

Choose the correct statement

1. Choose the correct typical algorithm from the following.
(a) Input → Output → Process
(b) Output → Input → Process
(c) Process → Input → Output
(d) Input → Process → Output
[Ans. (d) Input → Process → Output]

2. Choose the correct pair from the following

(a) Big O – Best case
(b) Big Ω - Worst case
(c) Big Θ - Average case
(d) Big μ - First case

[Ans. (c) Big Θ - Average case]

CHOOSE THE INCORRECT STATEMENT

1. (i) Linear search is also called sequential search
(ii) Bubble sort is also called comparison sort
(iii) Dynamic algorithms does not uses optimization technique memorization.
(iv) Binary search algorithm can not be done as divide and conquer search algorithm.

(a) i and ii (b) ii and iii
(c) iii and iv (d) Only iv

[Ans. (c) iii and iv]

2. (a) Prior estimates is a theoretical performance analysis of an algorithm
(b) Posteriori testing is called performance analysis of an algorithm.
(c) Efficiency of an algorithm decided by time and space factor.
(d) Space required by an algorithm is equal to the sum of fixed part and variable part

[Ans. (b) Posteriori testing is called performance analysis of an algorithm.]

3. (i) In Algorithm, All operations in should be well defined
(ii) Algorithms must not terminate after finite number of steps.
(iii) In algorithms, errors are acceptable
(iv) An algorithm should have step-by-step directions.

(a) i and ii (b) i, iii and iv
(c) ii and iii (d) iii only

[Ans. (c) ii and iii]

CHOOSE THE INCORRECT PAIR

1. Choose the incorrect pair from the following

(a) Big O – Worst case
(b) Big Ω - First case
(c) Big μ - Best case
(d) Big α - Average case

[Ans. (b) Big Ω - First case]

VERY SHORT ANSWERS 2 MARKS

1. Give an example of data structures.

Ans. Examples for data structures are arrays, structures, list, tuples, dictionary.

2. What in algorithmic strategy? Give an example.

Ans. **(i)** The way of defining an algorithm is called algorithmic strategy.

(ii) For example to calculate factorial for the given value n then it can be done by defining the function to calculate factorial once for the iteration-1 then it can be called recursively until the number of required iteration is reached.

3. What is algorithmic solution?

Ans. An algorithm that yields expected output for a valid input is called an algorithmic solution.

4. How the efficiency of an algorithm is defined?

Ans. Efficiency of an algorithm is defined by the utilization of time and space complexity.

5. What does analysis of an algorithm deals with?

Ans. **(i)** Analysis of an algorithm usually deals with the running and execution time of various operations involved.

(ii) The running time of an operation is calculated as how many programming instructions is executed per operation.

6. What is algorithm analysis?

Ans. An estimation of the time and space complexities of an algorithm for varying input sizes is called algorithm analysis.

7. How the time efficiency of an algorithm is measured. Give an example.

Ans. The time efficiency of an algorithm is measured by different factors. For example, write a program for a defined algorithm, execute it by using any programming language, and measure the total time it takes to run.

8. What is algorithmetic strategy?

Ans. A way of designing algorithm is called algorithmic strategy.

9. What is best algorithm?

Ans. The best algorithm to solve a given problem is one that requires less space in memory and takes less time to execute its instructions to generate output.

10. What are asymptotic notations?

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

11. What are the three asymptotic notations used to represent time complexity of algorithms?

Ans.
(i) Big O
(ii) Big W
(iii) Big μ

12. Write a note on Big omega asymptotic notation.

Ans. Big Omega is the reverse Big O, if Big 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).

13. Write a note on memorization.

Ans. Memoization or memoisation is an optimization technique used primarily to speed up computer programs by storing the results of expensive function calls and returning the cached result when the same inputs occur again.

SHORT ANSWERS 3 MARKS

1. List the manipulation manipulated effectively through data structures by algorithm.

Ans.

Search	To search an item in a data structure using linear and binary search.
Sort	To sort items in a certain order using the methods such as bubble sort, insertion sort, selection sort, etc.
Insert	To insert an item (s) in a data structure.
Update	To updata an existing item (s) in a data structure.
Delete	To delete an existing item (s) in a data structure.

2. Design an algorithm to find square of the given number and display the result.

Ans. The algorithm can be written as:
Step 1 – start the process
Step 2 – get the input x
Step 3 – calculate the square by multiplying the input value ie., square ← x* x
Step 4 – display the result square
Step 5 – stop

3. Write a note on time/space trade off.

Ans.
(i) A space-time or time-memory trade off is a way of solving in less time by using more storage space or by solving a given algorithm in very little space by spending more time.
(ii) To solve a given programming problem, many different algorithms may be used. Some of these algorithms may be extremely time-efficient and others extremely space-efficient.
(iii) Time/space trade off refers to a situation where you can reduce the use of memory at the cost of slower program execution, or reduce the running time at the cost of increased memory usage.

4. Write the different factors in which the time efficiency of an algorithm its measured.

Ans. The execution time that you measure in this case would depend on a number of factors such as:
(i) Speed of the machine
(ii) Compiler and other system Software tools
(iii) Operating System
(iv) Programming language used
(v) Volume of data required

5. Write a pseudo code for Binary search.

Ans. **Start with the middle element:**
(i) 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.
(ii) If not, then compare the middle element with the search value,
(iii) 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.
(iv) 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.
(v) When a match is found, display success message with the index of the element matched.
(vi) If no match is found for all comparisons, then display unsuccessful message.

6. Write a pseudo code for selection sort.

Ans. **(i)** Start from the first element i.e., index-0, we search the smallest element in the array, and replace it with the element in the first position.

(ii) Now we move on to the second element position, and look for smallest element present in the sub-array, from starting index to till the last index of sub - array.

(iii) Now replace the second smallest identified in step-2 at the second position in the or original array, or also called first position in the sub array.

7. Write a pseudo code for Insertion sort.

Ans. **Step 1** – If it is the first element, it is already sorted.
Step 2 – Pick next element
Step 3 – Compare with all elements in the sorted sub-list
Step 4 – Shift all the elements in the sorted sub-list that is greater than the value to be sorted
Step 5 – Insert the value
Step 6 – Repeat until list is sorted.

8. Write the steps to do dynamic programming.

Ans. **(i)** The given problem will be divided into smaller overlapping sub-problems.

(ii) An optimum solution for the given problem can be achieved by using result of smaller sub-problem.

(iii) Dynamic algorithms uses Memoization.

9. Write a pseudo code that defines Fibonacci Iterative algorithm with Dynamic programming approach.

Ans. The following shows a simple Dynamic programming approach for the generation of Fibonacci series.

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

For example if we generate fibobnacci series upto 10 digits, the algorithm will generate the series as shown below:
The Fibonacci series is : 0 1 1 2 3 5 8 13 21 34 55

Long Answers 5 MARKS

1. Write a note on Efficiency of an algorithm.

Ans. **(i)** Computer resources are limited that should be utilized efficiently. The efficiency of an algorithm is defined as the number of computational resources used by the algorithm.

(ii) An algorithm must be analyzed to determine its resource usage. The efficiency of an algorithm can be measured based on the usage of different resources.

(iii) For maximum efficiency of algorithm we wish to minimize resource usage. The important resources such as time and space complexity cannot be compared directly, so time and space complexity could be considered for an algorithmic efficiency.

Method for determining Efficiency :

(i) The efficiency of an algorithm depends on how efficiently it uses time and memory space.

(ii) The time efficiency of an algorithm is measured by different factors. For example, write a program for a defined algorithm, execute it by using any programming language, and measure the total time it takes to run.

(iii) The execution time that you measure in this case would depend on a number of factors such as:
- Speed of the machine
- Compiler and other system Software tools
- Operating System
- Programming language used
- Volume of data required

(iv) However, to determine how efficiently an algorithm solves a given problem, you would like to determine how the execution time is affected by the nature of the algorithm.

(v) Therefore, we need to develop fundamental laws that determine the efficiency of a program in terms of the nature of the underlying algorithm.

2. Differentiate Algorithm and program.

Ans.

Algorithm	Program
Algorithm helps to solve a given problem logically and it can be contrasted with the program	Program is an expression of algorithm in a programming language.
Algorithm can be categorized based on their implementation methods, design techniques etc	Algorithm can be implemented by structured or object oriented programming approach
There is no specific rules for algorithm writing but some guidelines should be followed.	Program should be written for the selected language with specific syntax
Algorithm resembles a pseudo code which can be implemented in any language	Program is more specific to a programming language

3. Explain the sorting algorithm that uses n-1 number passes to get the final sorted list.

Ans. (i) Insertion sort is a simple sorting algorithm. It works by taking elements from the list one by one and inserting then in their correct position in to a new sorted list.

(ii) This algorithm builds the final sorted array at the end. This algorithm uses n-1 number of passes to get the final sorted list as per the pervious algorithm as we have discussed.

Pseudo for Insertion sort :

Step 1 – If it is the first element, it is already sorted.

Step 2 – Pick next element

Step 3 – Compare with all elements in the sorted sub-list

Step 4 – Shift all the elements in the sorted sub-list that is greater than the value to be sorted

Step 5 – Insert the value

Step 6 – Repeat until list is sorted

☆☆☆

UNIT-II CORE PYTHON

CHAPTER 5 PYTHON-VARIABLES AND OPERATORS

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. Who developed Python?
(a) Ritche
(b) Guido Van Rossum
(c) Bill Gates
(d) Sunder Pitchai
[Ans. (b) Guido Van Rossum]

2. The Python prompt indicates that Interpreter is ready to accept instruction.
(a) >>> (b) <<<
(c) # (d) <<
[Ans. (a) >>>]

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
[Ans. (d) Ctrl + N]

4. Which of the following character is used to give comments in Python Program? *[PTA-6]*
(a) # (b) & (c) @ (d) $
[Ans. (a) #]

5. This symbol is used to print more than one item on a single line.
(a) Semicolon (;) (b) Dollor ($)
(c) comma (,) (d) Colon (:)
[Ans. (c) comma (,)]

6. Which of the following is not a token?
(a) Interpreter (b) Identifiers
(c) Keyword (d) Operators
[Ans. (a) Interpreter]

7. Which of the following is not a Keyword in Python?
(a) break (b) while
(c) continue (d) operators
[Ans. (d) operators]

8. Which operator is also called as Comparative operator? *[PTA-1]*
(a) Arithmetic (b) Relational
(c) Logical (d) Assignment
[Ans. (b) Relational]

9. **Which of the following is not Logical operator?**

(a) and (b) or
(c) not (d) Assignment

[Ans. (d) Assignment]

10. **Which operator is also called as Conditional operator?**

(a) Ternary (b) Relational
(c) Logical (d) Assignment

[Ans. (a) Ternary]

Part - II

Answer the following questions

(2 marks)

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

Ans. **(i)** In Pyhton, programs can be written in two namely Interactive mode and Script mode.

(ii) **Interactive mode** allows us to write codes in Python command prompt (>>>).

(iii) **Script mode** is used to create and edit python source file with the extension .py

2. **Write short notes on Tokens.** ***[PTA-4; HY-2019]***

Ans. Python breaks each logical line into a sequence of elementary lexical components known as **Tokens**. The normal token types are

(i) Identifiers,
(ii) Keywords,
(iii) Operators,
(iv) Delimiters and
(v) Literals.

3. **What are the different operators that can be used in Python?** ***[PTA-5, 6]***

Ans. **(i)** Operators are special symbols which represent computations, conditional matching in programming.

(ii) The operators that can be used in Python.

4. **What is a literal? Explain the types of literals?**

Ans. Literal is a raw data given in a variable or constant. In Python, there are various types of literals.

(i) **Numeric Literals** consists of digits and are immutable.

(ii) **String literal** is a sequence of characters surrounded by quotes.

(iii) **Boolean literal** can have any of the two values : True or False.

5. **Write short notes on Exponent data?**

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

Example: 12.E04, 24.e04.

Part - III

Answer the following questions

(3 marks)

1. **Write short notes on Arithmetic operator with examples.**

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

(ii) Most computer languages contain a set of such operators that can be used within equations to perform different types of sequential calculations.

(iii) Python supports the following Arithmetic operators.

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

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

Ans. **(i)** 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.

(ii) 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 i.e. x=30	>>> x+=20 #x=x+20
–=	Subtracted and assign back the result to left operand i.e. x=25	>>> x–=5 # x=x–5
*=	Multiplied and assign back the result to left operand i.e. x=125	>>> x*=5 # x=x*5
/=	Divided and assign back the result to left operand i.e. x=62.5	>>> x/=2 # x=x/2
%=	Taken modulus (Remainder) using two operands and assign the result to left operand i.e. x=2.5	>>> x%=3 # x=x%3
**=	Performed exponential (power) calculation on operators and assign value to the left operand i.e. x=6.25	>>> X**=2 # x=x**2
//=	Performed floor division on operators and assign value to the left operand i.e. x=2.0	>>> x//=3

3. Explain Ternary operator with examples. *[PTA-1]*

Ans. **(i)** Ternary operator is also known as conditional operator that evaluate something based on a condition being true or false.

(ii) It simply allows testing a condition in a single line replacing the multiline if-else making the code compact.

Syntax :

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

(iii) Example:

min = 50 if 49 < 50 else 70 // min = 50

min = 50 if 49 > 50 else 70 // min = 70

4. Write short notes on Escape sequences with examples.

Ans. **(i)** In Python strings, the backslash "\" is a special character, also called the **"escape"** character.

(ii) It is used in representing certain whitespace characters: **"\t"** is a tab, **"\n"** is a newline, and **"\r"** is a carriage return.

(iii) For example to print the message "It's raining", the Python command is

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

Escape sequence character	Description	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..

5. What are string literals? Explain.

Ans. **(i)** In Python, a string literal is a sequence of characters surrounded by quotes. Python supports single, double and triple quotes for a string.

(ii) A character literal is a single character surrounded by single or double quotes. The value with triple-quote ''' ''' is used to give multi-line string literal.

To test String Literals :

```
# Demo Program to test String Literals
    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)
# End of the Program
```

Output:

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

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. Describe in detail the procedure Script mode programming.

Ans. 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.

Creating Scripts in Python :

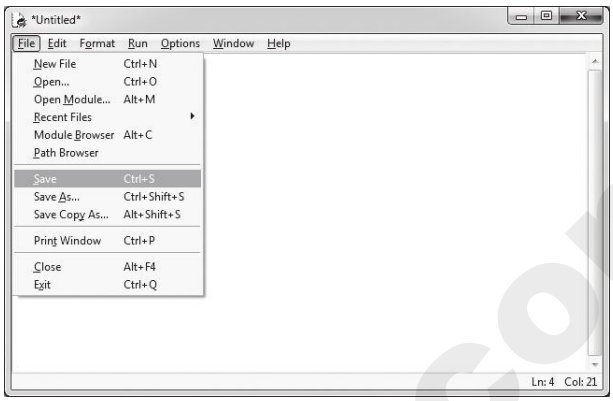
(i) Choose File → New File or press Ctrl + N in Python shell window.

(ii) An untitled blank script text editor will be displayed on screen.

(iii) Type the code in Script editor

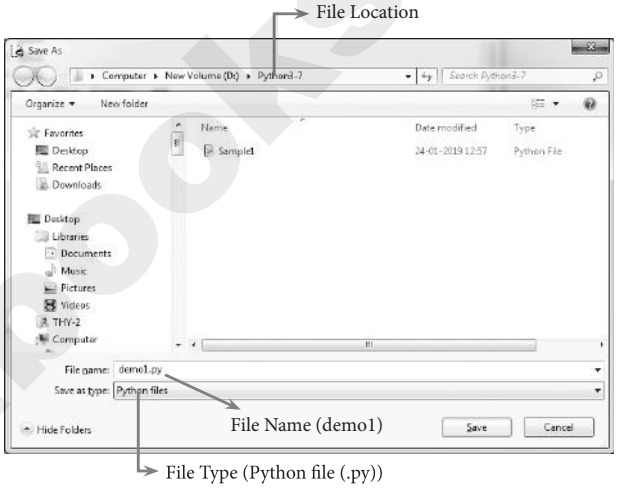
Saving Python Script :

(i) Choose **File → Save** or Press **Ctrl + S**



To Save the file First time

(ii) Now, **Save As** dialog box appears on the screen.



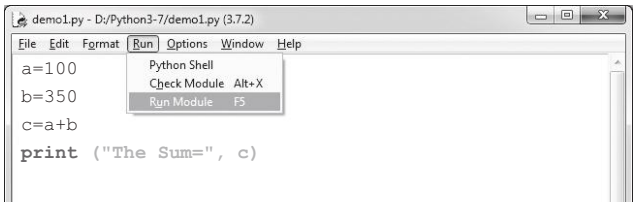
Save As Dialog Box

(iii) In the **Save As** dialog box, select the location where you want to save your Python code, and type the file name in **File Name** box. Python files are by default saved with extension **.py.** Thus, while creating Python scripts using Python Script editor, no need to specify the file extension.

(iv) Finally, click **Save** button to save your Python script.

Executing Python Script :

(i) Choose **Run → Run Module** or Press **F5**



To Execute Python Script

(ii) If code has any error, it will be shown in red color in the IDLE window, and Python describes the type of error occurred. To correct the errors, go back to Script editor, make corrections, save the file using **Ctrl + S** or **File → Save** and execute it again.

(iii) For all error free code, the output will appear in the IDLE window of Python.

2. Explain input () and print () functions with examples. *[Govt. MQP-2019; PTA-3]*

Ans. **Input and Output Functions :** 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 and the output function print() is used to display the result of the program on the screen after execution.

The input() function :

(i) In Python, input( ) function is used to accept data as input at run time. The syntax for input() function is,

Variable = input ("prompt string")

(ii) Where, prompt string in the syntax is a statement or message to the user, to know what input can be given.

(ii) 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.

(iv) If prompt string is not given in input( ) no message is displayed on the screen, thus, the user will not know what is to be typed as input.

(v) **Example 1 :** input( ) with prompt string

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

(vi) **Example 2 :** input( ) without prompt string

```
>>> city=input()
        Madurai
>>> print (I am from", city)
        I am from Madurai
```

(vii) Note that in example-2, the input( ) is not having any prompt string, thus the user will not know what is to be typed as input. If the user inputs irrelevant data as given in the above example, then the output will be unexpected. So, to make your program more interactive, provide prompt string with input( ).

(viii) 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.

(ix) **Example 3 :**

```
x = int (input("Enter Number 1: "))
y = int (input("Enter Number 2: "))
print ("The sum = ", x+y)
```

Output :

```
Enter Number 1: 34
Enter Number 2: 56
The sum = 90
```

The print() function :

(i) In Python, the print() function is used to display result on the screen. The syntax for print() is as follows :

(ii) **Example :**

```
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" ……)
```

(iii) **Example :**

```
>>> print ("Welcome to Python Programming")
        Welcome to Python Programming
>>> x = 5
>>> y = 6
>>> z = x + y
>>> print (z)
        11
>>> print ("The sum = ", z)
        The sum = 11
>>> print ("The sum of ", x, " and ", y, " is ", z)
        The sum of 5 and 6 is 11
```

(iv) The **print** ( ) evaluates the expression before printing it on the monitor.

(v) 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.

3. Discuss in detail about Tokens in Python.

[PTA-3; QY-2019]

Ans. Python breaks each logical line into a sequence of elementary lexical components known as **Tokens**. The normal token types are

(i) Identifiers,
(ii) Keywords,
(iii) Operators,
(iv) Delimiters and
(v) Literals.

(i) 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.

Example :

Example of valid identifiers : Sum, total_marks, regno, num1

Example of invalid identifiers : 12Name, name$, total-mark, continue

(ii) 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.
- **Python keywards :** false, class, If, elif, else, pass, break etc.

(iii) Operators :

- In computer programming languages operators are special symbols which represent computations, conditional matching etc.
- The value of an operator used is called **operands**.
- Operators are categorized as Arithmetic, Relational, Logical, Assignment etc. Value and variables when used with operator are known as **operands**.

Example :

```
a=100
b=10
print ("The sum = ",a+b)
print ("The a > b =", a>b)
print ("The a > b or a == b =", a > b or
                                  a==b)
a+=10
print("The a+=10 is =", a)
```

Output :

```
The sum = 110
The a>b = True
The a > b or a == b = True
The a+=10 is = 110
```

(iv) Delimiters : Python uses the symbols and symbol combinations as delimiters in expressions, lists, dictionaries and strings. Following are the delimiters.

(	)	[	]	{	}
,	:	.	'	=	;
+=	-=	*=	/=	//=	%=
&=	|=	^=	>>=	<<=	**=

(v) Literals : Literal is a raw data given in a variable or constant. In Python, there are various types of literals.

- **Numeric Literals** consists of characters surrounded by quotes.
- **String literal** is a sequence of characters surrounded by quotes.
- **Boolean literal** can have any of the two values : True or False.

PTA Questions and Answers

1 MARK

1. What will be the value of X from the following code snipped? *[PTA-2]*

```
A, B = 10, 3
X = A if (A/B==3) else B
print(X)
```

(a) 3 (b) 10
(c) True (d) False

[Ans. (d) False]

2. In how many ways programs can be written in Python? *[PTA-3]*

(a) Two (b) Three
(c) Four (d) Five

[Ans. (a) Two]

3. Which of the following is the valid Python program file name? *[PTA-3]*

(a) pycpp.py
(b) pycpp.cpp
(c) pycpp.c
(d) pycpp.js

[Ans. (a) pycpp.py]

4. **Which of the following statement(s) is not correct?** *[PTA-4]*

(1) Python is a general purpose programming language which can be used for both scientific and non-scientific programming.

(2) Python is a platform independent programming language.

(3) The prorams written in Python are difficult to read and understand.

(a) Statement (1) Only

(b) Statement (1) and (2)

(c) Statement (3) Only

(d) All statements

[Ans. (c) Statement (3) Only]

5. **The floor division operator in Python:** *[PTA-5]*

(a) / (b) % (c) %% (d) //

[Ans. (d) //]

2 MARKS

1. **What are keywords in Python?** *[PTA-1]*

Ans.

false	class	finally	Is	return
none	continue	For	Lambda	try

3. **What are the key features of Python?** *[PTA-3]*

Ans.

(i) It is a general purpose programming language which can be used for both scientific and non-scientific programming.

(ii) It is a platform independent programming language.

(iii) The programs written in Python are easily readable and understandable.

3 MARKS

1. **What are the rules to be followed while creating an identifier in Python?** *[PTA-2]*

Ans.

(i) An identifier must start with an alphabet (A..Z or a..z) or underscore (_)..

(ii) Identifiers may contain digits (0 .. 9).

(iii) Python identifiers are case sensitive i.e. uppercase and lowercase letters are distinct.

(iv) Identifiers must not be a **python** keyword.

(v) Python does not allow punctuation character such as %,$, @ etc., within identifiers.

5 MARKS

1. **Explain the different operators in Python.** *[PTA-1; HY-2019]*

Ans. In computer programming languages operators are special symbols which represent computations, conditional matching etc. The value of an operator used is called operands. Operators are categorized as Arithmetic, Relational, Logical, Assignment etc. Value and variables when used with operator are known as operands.

(i) Arithmetic operators :

An arithmetic operator is a mathematical operator that takes two operands and performs a calculation on them. They are used for simple arithmetic. Most computer languages contain a set of such operators that can be used within equations to perform different types of sequential calculations.

(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.

(iii) Logical operators :

In python, Logical operators are used to perform logical operations on the given relational expressions. There are three logical operators they are and, or and not.

(iv) Assignment operators :

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.

(v) Conditional operator :

Ternary operator is also known as conditional operator that evaluate 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.

Government Exam Questions and Answers

1 MARK

1. **Extension of Python files is** *[Govt. MQP-2019]*

(a) .Pyt (b) .txt
(c) .Odm (d) .Py

[Ans. (d) .Py]

2. **How many ways python program can be written?** *[QY-2019]*

(a) 2 (b) 2 (c) 3 (d) 1

[Ans. (a) 2]

3. **_____ separation is necessary between tokens.** *[QY-2019]*

(a) ; (b) Dellimiter
(c) WhiteSpace (d) :

[Ans. (c) WhiteSpace]

2 MARKS

1. **Define Operator and Operand.**

[Govt. MQP-2019]

Ans. **(i)** Operators are categorized as Arithmetic, Relational, Logical, Assignment etc. Value and variables when used with operator are known as operands.

(ii) Arithmetic operators :

An arithmetic operator is a mathematical operator that takes two operands and performs a calculation on them. They are used for simple arithmetic. Most computer languages contain a set of such operators that can be used within equations to perform different types of sequential calculations.

Additional Questions and Answers

Choose the Correct Answer 1 MARK

1. **Python language was released in**

(a) 1992 (b) 1991
(c) 1994 (d) 2001

[Ans. (b)1991]

2. **IDLE expansion is**

(a) Integrated Development Learning Environment
(b) Information Development Logical Environment
(c) Integrated Development Language Environment
(d) Interactive Development Learning Environment

[Ans. (a) Integrated Development Learning Environment]

3. **In Python, the script mode programs can be stored with the extension.**

(a) .pyt (b) .pyh
(c) .py (d) .pon

[Ans. (c) .py]

4. **Which of the following mode cannot be written Python program?**

(i) Interactive mode **(ii)** Script mode
(iii) Calculator mode **(iv)** Executable mode
(a) i (b) ii
(c) i and iii (d) iii and iv

[Ans. (d) iii and iv]

5. **Which of the following defines the Python interactive mode of programming?**

(a) >>> (b) <<<
(c) >> (d) <<

[Ans. (a) >>>]

6. **Which of the following mode allows to write codes in Python command prompt?**

(a) Script mode (b) Complier mode
(c) Interactive mode (d) Program mode

[Ans. (c) Interactive mode]

7. **Which mode can also be used as a simple calculator in Python?**

(a) Information (b) Intelligent
(c) Script (d) Interactive

[Ans. (d) Interactive]

8. **Which mode displays the python code result immediately?**

(a) Compiler (b) Interactive
(c) Script (d) Program

[Ans. (b) Interactive]

9. **Which of the following used to develop and run Python code?**

(a) GUI
(b) Command prompt
(c) IDLE (d) CUI

[Ans. (c) IDLE]

10. **Which mode can also be used as a simple calculator?**

(a) Calc mode (b) Interactive mode
(c) Script mode (d) Code mode

[Ans. (b) Interactive mode]

11. **Which of the following indicates in Python that interpreter is ready to accept instructions?**

(a) >>> (b) <<<
(c) .py (d) <<

[Ans. (a) >>>]

12. >>> indicates that
(a) IDLE is working in script mode
(b) Source program can be created and stored
(c) IDLE is working in Interactive mode
(d) It will not display the results immediately
[Ans. (c) IDEL is working in Interactive mode]

13. Which of the following command is used to execute Python script?
(a) Run → Python Module
(b) File → Run Module
(c) Run → Run Module
(d) Run → Module Fun
[Ans. (c) Run → Run Module]

14. Which function helps to enter data at run time by the user?
(a) input ( ) (b) read ( )
(c) get ( ) (d) Pyinput ( )
[Ans. (a) input ( )]

15. From the following statement absence of which one no message is displayed on the screen?
variable = input ("prompt string")
(a) Variable (b) input
(c) "prompt string" (d) " "
[Ans. (c) "prompt string"]

16. Which of the following function in Python is used to convert strings data as integer data explicitly?
(a) integer ( ) (b) num ( )
(c) int ( ) (d) number ( )
[Ans. (c) int ( )]

17. Multiline comments in Python enclosed with
(a) # # (b) < >
(c) ! ! (d) $ $
[Ans. (a) # #]

18. A sequence of elementary lexical components of Python statement is known as
(a) Keywords (b) Tokens
(c) Delimiters (d) Literals
[Ans. (b) Tokens]

19. Which of the following is not a type of token?
(a) Identifier (b) Keywords
(c) Literals (d) functions
[Ans. (d) functions]

20. Which of the following can not be identify by an identifier
(a) constant (b) variable
(c) function (d) class
[Ans. (a) constant]

21. Which of the following can be identify by an identifier?
(a) variable (b) function
(c) class (d) all of these
[Ans. (d) all of these]

22. If a = 100, then the expression a**2 output is
(a) 1000 (b) 10000
(c) 200 (d) 400
[Ans. (b) 10000]

23. If a = 100, then the expression a//30 is
(a) 10.0 (b) 0.10
(c) 3 (d) 3.0
[Ans. (c) 3]

24. Which of the following operator checks the relationship between two operands?
(a) Arithmetic (b) Comparative
(c) Assignment (d) Conditional
[Ans. (b) Comparative]

25. How may logical operators in Python?
(a) 2 (b) 4 (c) 5 (d) 3
[Ans. (d) 3]

26. Which operator replaces multiline if-else in Python?
(a) Conditional (b) Logical
(c) Relational (d) Assignment
[Ans. (a) Conditional]

27. In Python, the delimiters are not used in
(a) Expressions (b) functions
(c) dictioncuries (d) strings
[Ans. (b) functions]

28. Which of the following is a raw data given in a variable or constant?
(a) Information (b) Delimiters
(c) Literal (d) Keywords
[Ans. (c) Literal]

29. Which of the following is not a type of literal?
(a) Numeric (b) Expression
(c) String (d) Boolean
[Ans. (b) Expression]

30. What is the output for the following
m = 25 if 24 < 25 else 50
(a) 25 (b) 50 (c) 24<25 (d) 0
[Ans. (a) 25]

31. Which literal are immutable?
(a) Integer (b) Float
(c) Complex (d) All of these
[Ans. (d) All of these]

32. Which of the following is not a numerical literal type?
(a) Integer (b) Float
(c) Boolean (d) Complex
[Ans. (c) Boolean]

33. Which of the following is a sequence of characters surrounded by quotes?
(a) String (b) Complex
(c) Boolean (d) Octal
[Ans. (a) String]

34. The multipleline string literal given in
(a) ' ' (b) " "
(c) # # (d) "" ""
[Ans. (d) "" ""]

35. Which of the following characters is also called the "escape" character?
(a) \ (b) / (c) # (d) =
[Ans. (a) \]

36. Which of the following is not a fundamental data type?
(a) tuples (b) lists
(c) character (d) dictionaries
[Ans. (c) character]

37. A built-in number datatype supports.
(a) integers
(b) floating point numbers
(c) Complex umbers (d) all of these
[Ans. (d) all of these]

38. Which of the following character is used to denote long integer?
(a) N (b) LO (c) L (d) D
[Ans. (c) L]

39. Which of the following date includes decimal point?
(a) Character (b) String
(c) Boolean (d) Floating point
[Ans. (d) Floating point]

40. Exponent data example is
(a) 123.45 (b) .0537
(c) 2.4E–2 (d) Ox5
[Ans. (c) 2.4E–2]

41. How many floating point values needed to represent complex number?
(a) 2 (b) 3 (c) 1 (d) 0
[Ans. (a) 2]

42. A boolean data type have the values
(a) 0 or 1 (b) L or O
(c) O or Ox (d) true or false
[Ans. (d) true or false]

43. Which data can be enclosed with Single or Double or Triple quotes?
(a) Boolean (b) String
(c) Exponent (d) none of these
[Ans. (b) String]

MATCH THE FOLLOWING

1.

	List I		List II
i)	0b1010	1)	Hexadecimal Literal
ii)	100	2)	Octal Literal
iii)	Oo310	3)	Decimal Literal
iv)	Ox12c	4)	Binary Literal

	(i)	(ii)	(iii)	(iv)
(a)	1	2	3	4
(b)	1	3	2	4
(c)	4	2	3	1
(d)	4	3	2	1

[Ans. (d) (i)-4; (ii)-3; (iii)-2; (iv)-1]

2.

	List I		List II
i)	567	1)	Long Integer
ii)	0432	2)	Decimal Integer
iii)	53L	3)	Hexdecimal Integer
iv)	Ox562	4)	Octal Integer

	(i)	(ii)	(iii)	(iv)
(a)	2	4	1	3
(b)	2	1	4	3
(c)	2	3	4	1
(d)	4	2	1	3

[Ans. (a) (i)-2; (ii)-4; (iii)-1; (iv)-3]

CHOOSE THE ODD MAN OUT

1. (a) IDE (b) GUI
(c) IDLE (d) CWI [Ans. (d) CWI]
Reason : It is a National Research Institute for mathematics and computer science in Netherlands.

2. (a) < > (b) <<<
(c) < (d) >>> [Ans. (d) >>>]
Reason : It is a Python command prompt.

3. (a) Identifiers (b) Operators
(c) Literals (d) Tokens
[Ans. (d) Tokens]
Reason : The other options are the types of tokens.

4. (a) Pass (b) Fail
(c) Raise (d) elif [Ans. (b) Fail]

5. (a) and (b) or
(c) not equal to (d) not
[Ans. (c) not equal to]

6. (a) + = (b) //=
(c) /– (d) % =
(e) = = [Ans. (e) = =]

7. (a) ' ' (b) " "
(c) "' "' (d) "" ""
[Ans. (d) "" ""]

Choose and fill in the blanks

1. _____ mode is used to create and edit python source file.
(a) Script (b) Interactive
(c) Informative (d) Source
[Ans. (a) Script]

2. The _____ command is used to open Python shell window.
(a) File → File New (b) File → New
(c) File → New File (d) File → File Open
[Ans. (c) File → New File]

3. In Python Script Editor, the errors will be shown in _____ color in the IDLE window.
(a) red (b) green
(c) blue (d) orange
[Ans. (a) red]

4. Press _____ to execute Python Script.
(a) F2 (b) F3 (c) F4 (d) F5
[Ans. (d) F5]

5. The input ( ) function helps to enter data at _____ by the user.
(a) compile time (b) linking time
(c) run time (d) module time
[Ans. (c) run time]

6. The output function _____ is used to display the result of the Python Program.
(a) out ( ) (b) write ( )
(c) print ( ) (d) execute ( )
[Ans. (c) print ( )]

7. >>> print ("A = ", a _____ "B=", b).
(a) : (b) , (c) ; (d) : :
[Ans. (b) ,]

8. _____ = input ("Prompt string").
(a) variable (b) integer
(c) keyword (d) operator
[Ans. (a) variable]

9. What must be entered in _____ from the following statement to accept the value entered as integer?
X = _____ input ("Enter number")
(a) integer (b) int
(c) number (d) numeric
[Ans. (b) int]

10. The inputs ( ) accepts all data as _____ or _____.
(a) String or characters
(b) String or numbers
(c) Characters or numbers
(d) integers or exponent
[Ans. (a) String or characters]

11. In Python, comments begin with _____.
(a) / (b) # (c) \ (d) //
[Ans. (b) #]

12. The _____ statements are ignored by the Python interpreter.
(a) input ( ) (b) print ( )
(c) int ( ) (d) comments
[Ans. (d) comments]

13. Python uses _____ and _____ to define program blocks.
(a) Alt, Shift (b) Spaces, tabs
(c) tabs, functions (d) Ctrl, Shift
[Ans. (b) Spaces, tabs]

14. In Python, there are _____ normal token types.
(a) 4 (b) 3 (c) 5 (d) 7
[Ans. (c) 5]

15. In computer programming languages _____are special symbols which represent computations.
(a) keywords (b) literals
(c) delimiters (d) operators
[Ans. (d) operators]

16. Value and variables when used in operator are known as _____.
(a) Operands (b) Keywords
(c) Identifiers (d) functions
[Ans. (a) Operands]

17. _____ and _____ when used with operator are called operands.
(a) Keywords, identifiers
(b) Literals, delimiters
(c) Value, Variables
(d) Literals, Keywords
[Ans. (c) Value, Variables]

18. In Python _____ is a simple assignment operator.
(a) = (b) != (c) = = (d) #
[Ans. (a) =]

19. Python uses the symbols and symbol combinations as _____ in expressions.
(a) literals (b) keywords
(c) identifiers (d) delimiters
[Ans. (d) delimiters]

20. Numeric literals can belong to _____ different numerical types.
(a) 4 (b) 3 (c) 2 (d) 5
[Ans. (b) 3]

21. The _____ escape sequence character description is new line.
(a) \t (b) \l (c) \n (d) \h
[Ans. (c) \n]

22. All data values in Python are _____.
(a) objects (b) class
(c) type (d) functions
[Ans. (a) objects]

23. _____ data can be decimal, octal or hexadecimal.
(a) Character (b) Integer
(c) Escape sequence (d) Symbols
[Ans. (b) Integer]

24. Octal integer use _____ to denote octal digits.
(a) O (b) Ox (c) 8 (d) Oc
[Ans. (a) O]

25. _____ is to denote hexadecimal integer.
(a) 16 (b) O*x*
(c) O*x* (d) b or c
[Ans. (d) b or c]

26. Complex number is made up of two _____ values.
(a) Integer (b) String
(c) floating point (d) octal
[Ans. (c) floating point]

Choose the correct Statement

1. (i) In Python, programs can be written in many ways.
(ii) Interactive mode and script mode are the modes used to write programs in Python.
(iii) Python command prompt is <<<
(iv) In Python, interactive mode displays the result immediately and also used as a calculator.
(a) i and ii (b) ii and iii
(c) ii and iv (d) i, ii, iv
[Ans. (c) ii and iv]

2. (i) Python created by Guido Van Rossum.
(ii) Python shell can be used in two ways.
(iii) Python used whitespace to define blocks
(iv) Whitespace separation is necessary between tokens, identifiers or keywords.
(a) i and ii (b) ii, iii and iv
(c) i, ii and iv (d) i, ii and iii
(e) all of these **[Ans. (e) all of these]**

3. **Which of the following is the correct statement in Python?**
(a) print ('string to be displayed as output ')
(b) print (a) ;
(c) print (" T sum = ", a)
(d) print ("X=", x, "Y = ",y) ;
[Ans. (c) print ("T sum = ", a)]

Choose the correct Pair

1.

(a)	File → File New	to open Python Interactive mode
(b)	File → File New	to work with Python Script Mode
(c)	F5	to modify the python script
(d)	>>>	is a python script mode prompt

[Ans. (b) File → File New – to work with Python Script Mode]

2. **Choose the correct pair from the following if a = 100 and b = 45.**
(a) a = = b – false (b) a > b – false
(c) a < b – false (d) a ! = b – false
[Ans. (a) a = = b – false]

3. (a) Octal literal – Ob1010
(b) Hexadecimal literal – 0100
(c) Complex literal – 3+5.6j
(d) Binary literal – Oo310
[Ans. (c) Complex literal – 3+5.6j]

4. (a) O102 – hexadecimal integer
(b) Ox432 – Octal Integer
(c) 2EO – Exponent data
(d) 12.45 – Integer data
[Ans. (c) 2EO – Exponent data]

Choose the incorrect statement

1. (i) Python script is a file that contains python statements
(ii) Python script are not reusable code
(iii) Python scripts can be executed many times without retyping
(iv) Python scripts are editable
(a) i only (b) ii only
(c) iii only (d) i and iv
[Ans. (b) ii only]

2. (i) Python script is a file that contains python statements
(ii) Python script are not reusable code
(iii) Python scripts cannot be executed again and again without retyping
(iv) Python scripts are editable.
(a) i and ii (b) iii and iv
(c) i and iii (d) ii and iii
[Ans. (d) ii and iii]

3. (i) The input ( ) accepts all types of data (string, characters, numbers)
(ii) Python uses whitespace to define program blocks
(iii) Comments in python begin with #
(iv) Python uses { } to define program blocks
(a) i and iv (b) i, iii and iv
(c) ii and iv (d) ii and iii
[Ans. (a) i and iv]

4. (i) Python identifiers must start with an alphabet
(ii) Python identifiers many contain digits
(iii) Python identifiers are not case sensitive
(iv) Python allows %,$@ characters with in identifiers.
(a) i, ii (b) ii, iii
(c) iii, iv (d) ii, iv
[Ans. (c) iii, iv]

5. (i) Tuples, lists and dictionaries are not fundamental data types
(ii) Python uses spaces and tabs to define program blocks
(iii) String data is denoted by O or Ox
(iv) Complex number is made up of two integer values
(a) i, ii, iii (b) i, ii
(c) ii, iii, iv (d) i, iii, iv
[Ans. (d) i, iii, iv]

Choose the incorrect Pair

1.

(i)	Ctrl + N	to create a new python script
(ii)	Ctrl + S	to save the python script
(iii)	F5	to modify the python script
(iv)	Run → Run Module	to excuse the python script

(a) i, ii, iii (b) i and ii
(c) ii, iii, iv (d) ii and iii
[Ans. (d) ii and iii]

2. (a) 100 / 10 – 10.0
(b) 100 % 30 – 10
(c) 100 // 30 – 10.0
(d) 100 *×2 – 10000
[Ans. (c) 100 // 30 – 10.0]

3. **Choose the incorrect pair from the following if a = 100 and b = 45.**
(a) a = = b – false
(b) a ! = b – false
(c) a > = b – True
(d) a < b – false **[Ans. (b) a! = b – false]**

4.

(a)	Literal	Numeric, string, Boolean
(b)	Delimiters	Symbols and symbol combinations
(c)	Escape sequences	\t, \\, \n
(d)	Conditional operator	also known as operands operator

[Ans. (d) Conditional operator – also known as operands operator]

5. (a) x = y (b) x = 'y'
(c) x = "y" (d) x = '"y"'
[Ans. (d) x = '"y"']

6.

(a)	print ("Doesn\'t")	Doesn't
(b)	print ("\" Python \" ")	"Python"
(c)	print ("Python", "\t", "lang..")	Python Lang
(d)	print ("Python", "\n", "Lang..")	Python Lang...

[Ans. (d) print ("Python", "\n", "Lang..") – Python Lang..]

7. (a) 102 – Decimal Integer
(b) 0789 – Octal Integer
(c) Ox 102 – hexadecimal Integer
(d) 342 – Long Integer

[Ans. (b) 0789 – Octal Integer]

VERY SHORT ANSWERS 2 MARKS

1. How will you develop and run Python code?

Ans. The version 3.x of Python IDLE (Integrated Development Learning Environment) is used to develop and run Python code.

2. How many ways the Python shell can be used?

Ans. Python shell can be used in two ways, viz., Interactive mode and Script mode.

3. How the interactive mode of Python shell can be used as simple calculator?

Ans. In interactive mode Python code can be directly typed and the interpreter displays the result(s) immediately. The interactive mode can also be used as a **simple calculator**.

4. How will you invoke python IDLE?

Ans. **(i)** The following command can be used to invoke Python IDLE from Window OS.

(ii) Start → All Programs → Python 3.x → IDLE (Python 3.x)

(Or)

(iii) Click python 

Icon on the Desktop if available.

5. How will you know the python IDLE working in interactive mode?

Ans. The prompt (>>>) indicates that Interpreter is ready to accept instructions. Therefore, the prompt on screen means **IDLE** is working in interactive mode.

6. What is the purpose of using input : output functions?

Ans. The **input()** function helps to enter data at run time by the user and the output function **print()** is used to display the result of the program on the screen after execution.

7. Write the Syntax of using print () in python.

Ans. **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" ……)

8. How will you display more than one item in print ( )?

Ans. **Comma (,)** is used as a separator in **print ( )** to print more than one item.

9. Write the syntax of input ( ) used in python.

Ans. 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.

10. Name the tokens where the whitespace in necessary in python.

Ans. Whitespace separation is necessary between tokens, identifiers or keywords.

11. Why the following identifiers are invalid?
(i) 12 Name (ii) name$
(iii) physics–mark (iv) break

Ans. **(i)** An identifies must start with an alphabet.
(ii) No punctuation characters are allowed.
(iii) Only underscore (–) allowed.
(iv) Identifiers must not be a Python keyword.

12. Find the odd man out? Give reason.
(i) sum = 100 (ii) regno = 12401
(iii) name = "Kannan"
(iv) name = "Kumar"

Ans. **(iv)** name = "Kumar"
Reason : No function character allowed within identifiers.

13. Write a note on relational or comparative operator.

Ans. 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**.

14. Assume the value of a = 100 and b = 75. Evaluate the following expression.
(i) a==b (ii) a!=b (iii) a//b
(iv) a>=b

Ans. **(i)** False **(ii)** true
(iii) 1 **(iv)** true.

15. What are the uses of logical operator? Name the operators.

Ans. In python, Logical operators are used to perform logical operations on the given relational expressions. There are three logical operators they are **and, or** and **not**.

16. **Assume a = 50 and b = 40. Write the output the following statement.**

(i) **print ("The a > b or a == b = ",a>b or a==b)**

(ii) **print ("The a > b and a == b = ",a>b and a==b)**

(iii) **print ("The not a > b = ",not a>b)**

Ans. **(i)** The a > b or a == b = True

(ii) The a > b and a == b = False

(iii) The not a > b = False.

17. **Write the output for the following code.**

```
x,y = 50,150
Z = x if x>y else y
print ("Z is", Z)
```

Ans. Z is 150.

18. **Name the types of Numeric literals in python.**

Ans. Numeric literals can belong to 3 different numerical types Integer, Float and Complex.

19. **Write the description of the following Escape sequence character.**

(i) **\n** **(ii)** **\t**

Ans. **(i)** New line

(ii) Tab

20. **Name the built – in number objects in python.**

Ans. The built-in number objects in Python supports integers, floating point numbers and complex numbers.

21. **What are keywords?**

Ans. Keywords are special words that are used by Python interpreter to recognize the structure of program.

Short Answers **3 MARKS**

1. **Write the function of the following**

(i) Ctrl + N **(ii) Ctrl + S** **(iii) F5**

Ans. **(i)** to open Python shell window.

(ii) to save the Python file.

(iii) to run the Python program.

2. **Fill in the blanks**

```
>>>city = __(1)__("Enter your City")
Enter your city : __(2)__
>>> print ("I am from", __(3)__ )
I am from Chennai.
```

Ans. (1) input (2) Chennai (3) City.

3. **Fill up the blanks to get the following output from Python code given.**

Output :

```
Enter Number 1 : 34
Enter Number 2 : 70
The Sum      = 104
```

Code :

```
X = __(1)__ (input ("Enter Number 1 :"))
Y = __(2)__ ( __(3)__ ("Enter Number 2 : "))
__(4)__ ("The sum = ", __(5)__ )
```

Ans. (1) int (2) int (3) input (4) print (5) x + y

4. **Why the following statement not accept the data as numbers? Give reason and also state what function is used to accept the number.**

Ans. x = input ("Enter number")

Reason : 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.

5. **Write a Python programme to get the following output.**

Output :

```
Enter Number 1 : 50
Enter Number 2 : 50
X = 50        Y = 50
```

Ans.

```
x,y=int (input("Enter Number 1 :")),
int (input ("Enter Number 2:"))
print ("X = ",x," Y = ",y)
```

Output :

```
Enter Number 1 :30
Enter Number 2:50
X = 30  Y = 50
```

6. **Write a Python program to get the following output.**

Output :

```
Enter Number 1 : 50
Enter Number 2 : 50
The sum of 50 and 50 is 100
```

Ans.

```
x = int(input ("Enter Number 1")
y = int(input("Enter Number 2")
print ("The sum of ", x, "and", y, "is", x+y)
```

7. Write a short note on comment statement.

(or)

Write a note on statement which are ignored by the Python interpreter.

Ans. **(i)** In Python, comments begin with hash symbol (#). The lines that begins with # are considered as comments and ignored by the Python interpreter.

(ii) Comments may be single line or no multi-lines. The multiline comments should be enclosed within a set of # as given below.

```
# It is Single line Comment
# It is multiline comment
which contains more than one line #
```

8. How will you define program blocks in python?

Ans. **(i)** Python uses whitespace such as **spaces** and **tabs** to define program blocks whereas other languages like C, C++, java use curly braces { } to indicate blocks of codes for class, functions or body of the loops and block of selection command.

(ii) The number of whitespaces (spaces and tabs) in the indentation is not fixed, but all statements within the block must be indented with same amount spaces.

9. Fill in the blanks

(i) _____ statements are ignored by Python interpreter.

(ii) The value of an operator used is called _____.

(iii) 100//30 = _____.

Ans. **(i)** Comment

(ii) Operands

(iii) 3

10. Assume a = 1000 b = 10, Evaluate the following expression.

(i) a%30 (ii) a/b (iii) b2 (iv) b//3**

Ans. **(i)** 100

(ii) 100.0

(iii) 100

(iv) 3

11. Identify the type of literals.

(i) OX13B (ii) i+34j (iii) 12e05

(iv) 0346

Ans. **(i)** Hexadecimal literal

(ii) Complex literal

(iii) Floating point literal

(iv) Octal literal.

12. How will you represent Octal, hexadecimal and long integer data?

Ans. Integer Data can be decimal, octal or hexadecimal. Octal integer use **O** (both upper and lower case) to denote octal digits and hexadecimal integer use **OX** (both upper and lower case) and L (only upper case) to denote long integer.

LONG ANSWERS — 5 MARKS

1. Write the output for the following python code.

```
x=10
x+=20
print ("The x += 20 is =",x)
x-=5
print ("The x -= 5 is = ",x)
x*=5
print ("The x *= 5 is = ",x)
x/=2
print ("The x /= 2 is = ",x)
x%=3
print ("The x %= 3 is = ",x)
x**=2
print ("The x **= 2 is = ",x)
x//=3
print ("The x //= 3 is = ",x)
```

Ans. **Output :**

```
Type a Value for X : 10
The x += 20 is = 30
The x -= 5 is = 25
The x *= 5 is = 125
The x /= 2 is = 62.5
The x %= 3 is = 2.5
The x **= 2 is = 6.25
The x //= 3 is = 2.0
```

☆☆☆

CHAPTER 6 CONTROL STRUCTURES

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. How many important control structures are there in Python?
(a) 3 (b) 4 (c) 5 (d) 6
[Ans. (a) 3]

2. elif can be considered to be abbreviation of
(a) nested if (b) if..else
(c) else if (d) if..elif
[Ans. (c) else if]

3. What plays a vital role in Python programming?
(a) Statements (b) Control
(c) Structure (d) Indentation
[Ans. (d) Indentation]

4. Which statement is generally used as a placeholder?
(a) continue (b) break
(c) pass (d) goto
[Ans. (c) pass]

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
[Ans. (c) Relational or Logical expression]

6. Which is the most comfortable loop?
(a) do..while (b) while
(c) for (d) if..elif
[Ans. (c) for]

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
[Ans. (a) 12]

8. What is the output of the following snippet?

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

(a) False (b) True
(c) 0 (d) 1
[Ans. (b) True]

9. Which amongst this is not a jump statement ?
(a) for (b) pass
(c) continue (d) break
[Ans. (a) for]

10. Which punctuation should be used in the blank?

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

(a) ; (b) : (c) :: (d) !
[Ans. (b) :]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. List the control structures in Python. *[PTA-6]*

Ans. There are three important control structures are,
(ii) Sequential
(ii) Alternative or Branching
(iii) Iterative or Looping

2. Write note on break statement.

Ans. The **break** statement terminates the loop containing it. Control of the program flows to the statement immediately after the body of the loop.

3. Write is the syntax of if..else statement

Ans. **Syntax :**

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

4. Define control structure. *[PTA-2]*

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

5. Write note on range () in loop. *[PTA-2]*

Ans. range() generates a list of values starting from **start** till **stop-1**.

range (start,stop,[step])

Where,

start – refers to the initial value

stop – refers to the final value

step – refers to increment value, this is optional part.

PART - III

ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. Write a program to display *[PTA-5]*

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

Ans.

```
for i in range (1, 6):
        for j in range (65, 65 + i)
                a=chr(j)
        print
```

2. Write note on if..else structure.

Ans. **(i)** The **if.. else** statement provides control to check the true block as well as the false block.

(ii) **if..else** statement thus provides two possibilities and the condition determines which BLOCK is to be executed.

(iii) Syntax:

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

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

Ans. **Code :**

```
n1=int(input(:Enter the first number:"))
n2=int(input("Enter the second number:"))
n3=int(input(:Enter the third number:"))
if(n1?=n2)and(n1>=n3):
    biggest=n1;
elif(n2>=n1)and (n2>=n3):
    biggest=n2
else:
    biggest=n3
print("The biggest number
      between",n1,",",n2,"and",n3,"is",biggest)
```

Output :

```
Enter the first number:1
Enter the second number:3
Enter the third number:5
The biggest number between 1,3 and 5 is 5
```

4. Write the syntax of while loop. *[PTA-4; QY-2019]*

Ans. **Syntax:**

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

5. List the differences between break and continue statements. *[HY-2019]*

Ans.

Break	Continue
The break statement terminates the loop containing it.	The continue statement is used to skip the remaining part of a loop.
Control of the program flows to the statement immediately after the body of the loop.	Control of the program flows start with next iteration.
Syntax : break	**Syntax :** continue

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. Write a detail note on for loop. *[Govt. MQP-2019]*

Ans. **(i) for loop :** for loop is the most comfortable loop. It is also an entry check loop. The condition is checked in the beginning and the body of the loop(statements-block 1) is executed if it is only True otherwise the loop is not executed.

(ii) Syntax:

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

(iii) The counter_variable mentioned in the syntax is similar to the control variable that we used in the **for** loop of C++ and the sequence refers to the initial, final and increment value. Usually in Python, **for** loop uses the range() function in the sequence to specify the initial, final and increment values. range() generates a list of values starting from **start** till **stop-1**.

(iv) The syntax of range() is as follows:

range (start,stop,[step])

Where,

start – refers to the initial value

stop – refers to the final value

step – refers to increment value, this is optional part.

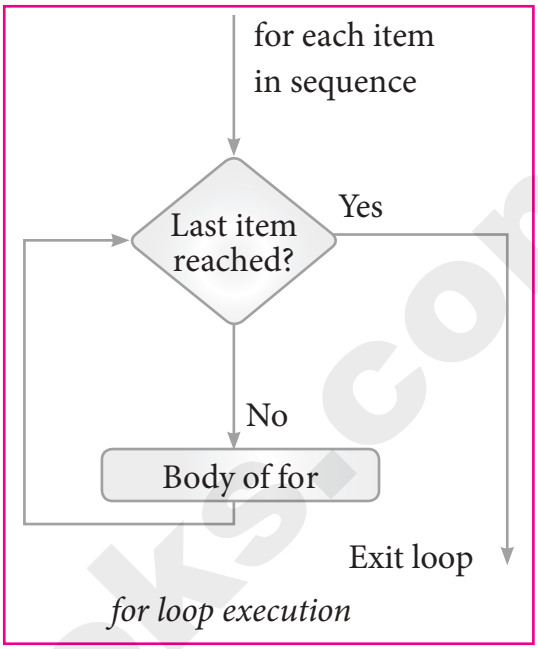
Examples for range() :

range (1,30,1) - will start the range of values from 1 and end at 29

range (2,30,2) - will start the range of values from 2 and end at 28

range (30,3,-3) - will start the range of values from 30 and end at 6

range (20) - will consider this value 20 as the end value(or upper limit) and starts the range count from 0 to 19 (remember always range() will work till stop -1 value only)



for loop execution

Example :

```
#Program to illustrate the use of for loop - to print single digit even number
for i in range (2,10,2):
    print (i, end=' ')
```

Output :

2 4 6 8

2. Write a detail note on if..else..elif statement with suitable example. *[HY-2019]*

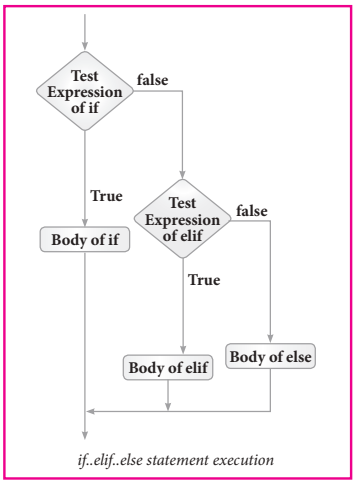
Ans. **Nested if..elif...else statement :**

(i) When we need to construct a chain of if statement(s) then **'elif'** clause can be used instead of **'else'**.

(ii) Syntax :

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

(iii) In the syntax of **if..elif..else** mentioned above, condition-1 is tested if it is true then statements-block1 is executed, otherwise the control checks condition-2, if it is true statements-block2 is executed and even if it fails statements-block n mentioned in **else** part is executed.



if..elif..else statement execution

(iv) **'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.

(v) **Example :** #Program to illustrate the use of nested if statement

Average	Grade
>=80 and above	A
>=70 and <80	B
>=60 and <70	C
>=50 and <60	D
Otherwise	E

```
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")
elif avg>=70 and avg<80:
    print ("Grade : B")
elif avg>=60 and avg<70:
    print ("Grade : C")
elif avg>=50 and avg<60:
    print ("Grade : D")
else:
    print ("Grade : E")
```

Output 1:

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

Output 2 :

Enter mark in second subject : 73
Grade : B

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

Ans.

```
for a in range (100, 1000):
    if a %2==1:
        print b
```

Output :

101, 103, 105, 107 ... . 997, 999

4. Write a program to display multiplication table for a given number.

Ans. **Multiplication table :**

```
num = int(input("Enter the number : "))
prit("multiplication Table of", num)
for i in range(1,11):
    print (num, "x", i, " = ", num*i)
```

Output :

Enter the number : 6
Multiplication Table of 6
6 × 1 = 6
6 × 2 = 12
6 × 3 = 18
6 × 4 = 24
6 × 5 = 30
6 × 6 = 36
6 × 7 = 42
6 × 8 = 48
6 × 9 = 54
6 × 10 = 60

Hands on Experience

1. Write a program to check whether the given character is a vowel or not. *[QY-2019]*

Ans. **Program :**

```
ch = input ("Enter a character")
if ch in ('a', 'A', 'e', 'E', 'i', 'I','o','O','u', 'U'):
print (ch, 'is a vowel')
else :
print (ch, 'the letter is not a vowel')
```

2. Using if..else..elif statement check smallest of three numbers.

Ans. **Program :**

```
num1 = int(input("Enter first number :"))
num2 = int(input("Enter second number : "))
num3 = int(input("Enter third number : "))
if(num1 < num2) and (num1 < num3):
    smallest=num1
elif(num2 < num1) and (num2 < num3):
    smallest=num2
else :
    smallest=num3
print("The smallest number is", smallest)
```

Output :

```
Enter first number : 12
Enter second number : 7
Enter third number : 15
The smallest number is 7
```

3. Write a program to check if a number is Positive, Negative or zero.

Ans. **Program :**

```
num = int(input("Enter a number :"))
if num > 0:
    print("positive number")
elif num==0:
    print("zero")
else :
    print("Negative number")
```

4. Write a program to display Fibonacci series 0 1 1 2 3 4 5 ..... (upto a terms).

Ans. **Program :**

```
nterms = int(input("How many terms?"))
n1 = 0
n2 = 1
count = 2
# check if the number of  terms is valid
if nterms <=0:
    print("please enter a positive integer")
elif nterms ==1:
    print("Fibonacci sequence :")
    print(n1)
else :
    print("Fibonacci sequence :")
    print(n1, ",", n2, end = ".")
while count < nterms :
    nth = n1 + n2
    print(nth, end = ',')
    n1 = n2
    n2 = nth
    count + = 1
```

Output :

```
How many terms? 10
Fibonacci sequence :
0, 1, 1, 2, 3, 5, 8, 13, 21, 34
```

5. Write a program to display sum of natural numbers, upto n. *[QY-2019]*

Ans. **Program :**

```
n = input("Enter any number")
sum = 0
for i in range(i, n=+1):
    sum = sum + i
print "sum =", sum
```

Output :

```
Enter any number 5
sum = 15
```

6. Write a program to check if the given number is a palindrome or not.

Ans. **Program :**

```
n = int (input("Enter the number:"))
temp = n
rev = 0
    while (n > 0):
    dig = n%10
    rev  = rev * 10 + dig
    n = n//10
if(temp ==rev):
    print ("palindrome"
else:
    print ("not a palindrome")
```

Output :

```
Enter any Number 2332
palindrome
```

7. **Write a program to print the following pattern**

```
* * * * *
* * * *
* * *
* *
*
```

Ans. **Program :**

```
for i in range (0, 5):
    for j in range (5, i –1):
        print ("*", end = " ")
    print ()
```

8. **Write a program to check if the year is leap year or not.**

Ans. **Program :**

```
n = int (input ("Enter any year"))
If y % 4 = = 0):
    print "Leap Year"
else:
    print "Not a leap Year")
```

Output :

```
Enter any Year 2000
Leap Year
```

PTA Questions and Answers

1 MARK

1. **What will be the output of the following python code?** *[PTA-1]*

```
for i in range(1, 10, 2):
    print(i, end=' ')
```

(a) 1 3 5 7 9 (b) 1 2 4 6 8
(c) 2 4 6 8 10 (d) 1 3 5 7 10

[Ans. (a) 1 3 5 7 9]

2. **Which is not a jump statement?** *[PTA-2]*

(a) for (b) goto
(c) continue (d) break

[Ans. (b) goto]

3. **What will be the output of the following Python snippet?** *[PTA-3]*

```
a=15
while (a<=20):
    print(a%a, end=' ')
    i = i + 1
```

(a) 15 16 17 18 19 20 (b) 20 19 18 17 16 15
(c) 0 0 0 0 0 0 (d) 1 1 1 1 1 1

[Ans. (a) 15 16 17 18 19 20]

4. **Match the following :** *[PTA-4]*

(a) if...elif	-	(i)	Jump
(b) while	-	(ii)	Block
(c) pass	-	(iii)	Loop
(d) indentation	-	(iv)	Branching

(a) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
(b) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
(c) (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)
(d) (a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)

[Ans. (a) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)]

5. **The optional parameter of range() function in Python.** *[PTA-5]*

(a) start (b) stop
(c) step (d) slice

[Ans. (d) slice]

6. **Which of the following is not a jump keyword.** *[PTA-6]*

(a) pass (b) continue
(c) skip (d) break

[Ans. (c) skip]

2 MARKS

1. **What will be the output of the following snippet?** *[PTA-5]*

```
alpha=list(range(65, 70)
for x in alpha:
    print(chr(x), end='\t')
```

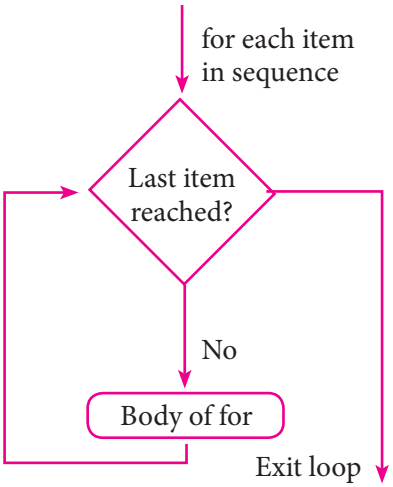
Ans. **Output :**

```
65 66 67 68 69 70
End of the loop
```

3 MARKS

1. **What is the role of range() in for loop of Python?** *[PTA-1]*

Ans.
range (1,30,1) - will start the range of values from 1 and end at 29
range (2,30,2) - will start the range of values from 2 and end at 28
range (30,3,-3) - will start the range of values from 30 and end at 6
range (20) - will consider this value 20 as the end value(or upper limit) and starts the range count from 0 to 19 (remember always range() will work till stop -1 value only)



for loop execution

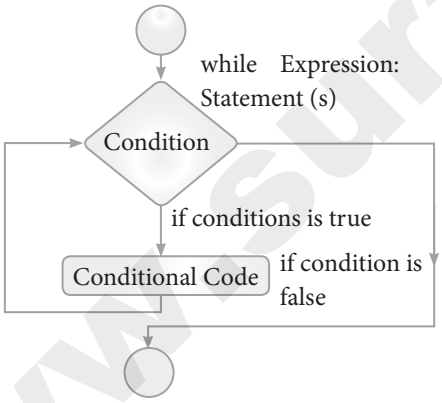
2. Draw a flow chart to explain while loop. *[PTA-2]*

Ans. **while loop**

(i) The syntax of while loop in Python has the following syntax:

Syntax:

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



while loop execution

(ii) In the while loop, the condition is any valid Boolean expression returning True or False. The else part of while is optional part of while. The statements block1 is kept executed till the condition is True. If the else part is written, it is executed when the condition is tested False. Recall while loop belongs to entry check loop type, that is it is not executed even once if the condition is tested False in the beginning.

3. Write the syntax of if....elif....else statement in Python. *[PTA-3]*

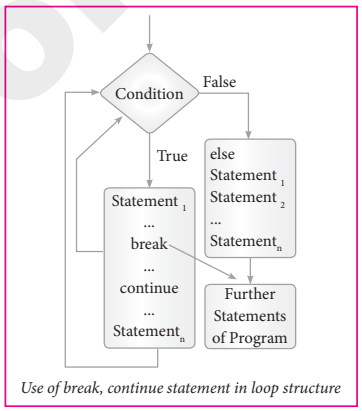
Ans. **Syntax :**

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

5 MARKS

1. Explain briefly about Jump statements in Python. *[PTA-1, 6]*

Ans. The jump statement in Python, is used to unconditionally transfer the control from one part of the program to another. There are three keywords to achieve jump statements in Python : **break, continue, pass**. The following flowchart illustrates the use of break and continue.



Use of break, continue statement in loop structure

(i) break statement : The **break** statement terminates the loop containing it. Control of the program flows to the statement immediately after the body of the loop.

A **while** or **for** loop will iterate till the condition is tested false, but one can even transfer the control out of the loop (terminate) with help of **break** statement. When the break statement is executed, the control flow of the program comes out of the loop and starts executing the segment of code after the loop structure.

If break statement is inside a nested loop (loop inside another loop), break will terminate the innermost loop.

Syntax:

break

(ii) continue statement : Continue statement unlike the break statement is used to skip the remaining part of a loop and start with next iteration.

Syntax: *continue*

(iii) pass statement : pass statement is generally used as a placeholder. When we have a loop or function that is to be implemented in the future and not now, we cannot develop such functions or loops with empty body segment because the interpreter would raise an error. So, to avoid this we can use pass statement to construct a body that does nothing.

Syntax:

pass

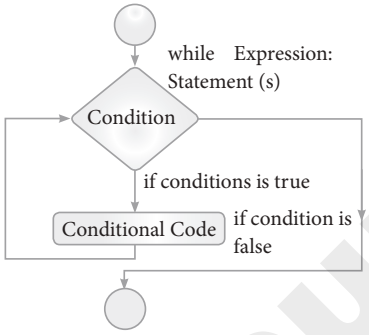
2. What are the different types of loops in Python? Explain with an example. ***[PTA-3; 4]***

Ans. **(i) while loop**

(a) The syntax of while loop in Python has the following syntax:

Syntax:

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



while loop execution

(b) In the while loop, the condition is any valid Boolean expression returning True or False. The else part of while is optional part of while. The statements block1 is kept executed till the condition is True. If the else part is written, it is executed when the condition is tested False. Recall while loop belongs to entry check loop type, that is it is not executed even once if the condition is tested False in the beginning.

Example : program to illustrate the use of while loop - to print all numbers from 10 to 15

```
i=10                          # intializing part of
                                the control variable
while (i<=15):                # test condition
    print (i,end='\t')        # statements - block 1
    i=i+1                     # Updation of the
                                control variable
```

Output :

10 11 12 13 14 15

(ii) for loop :

for loop is the most comfortable loop. It is also an entry check loop. The condition is checked in the beginning and the body of the loop(statements-block 1) is 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]

The counter_variable mentioned in the syntax is similar to the control variable that we used in the for loop of C++ and the sequence refers to the initial, final and increment value. Usually in Python, for loop uses the range() function in the sequence to specify the initial, final and increment values. range() generates a list of values starting from start till stop-1.

Example : Examples for range()

range (1,30,1) - will start the range of values from 1 and end at 29
range (2,30,2) - will start the range of values from 2 and end at 28
range (30,3,-3) - will start the range of values from 30 and end at 6
range (20) - will consider this value 20 as the end value(or upper limit) and starts the range count from 0 to 19 (remember always range() will work till stop -1 value only)

(iii) Nested loop structure :

A loop placed within another loop is called as nested loop structure. One can place a while within another while; for within another for; for within while and while within for to construct such nested loops.

Following is an example to illustrate the use of for loop to print the following pattern

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Government Exam Questions and Answers

1 MARK

1. **The output of the Segment.** *[Govt. MQP-2019]*

```
for in range (10, 0, 2)
print(i)
```

is

(a) 10 9 6 4 2 0 (b) 10 8 6 4 2
(c) 0 2 4 6 8 10 (d) Error

[Ans. (d) Error]

2. **Which is optional part in range () function?** *[QY-2019]*

(a) end (b) step
(c) stop (d) start

[Ans. (b) step]

3. **Which statement is used to skip the remaining part of a loop and start with next iteration?** *[HY-2019]*

(a) break (b) continue
(c) return (d) goto

[Ans. (b) continue]

2 MARKS

1. **What are the types of looping supported by Python?** *[Govt. MQP-2019]*

Ans. Python provides two types of looping supports:

(i) while loop
(ii) for loop

2. **Write a Python program to print.** *[HY-2019]*

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

Ans.

```
i = 1
while(i<=6):
for j in range (1, i):
print (j, end='/t)
print (end='/n')
i+ = 1
```

3 MARKS

1. **Which jump statement is used as placeholder? Why?** *[Govt. MQP-2019]*

Ans. **Nested loop structure :**

(i) A loop placed within another loop is called as nested loop structure. One can place a while within another while; for within another for; for within while and while within for to construct such nested loops.

(ii) Following is an example to illustrate the use of for loop to print the following pattern

```
1
1   2
1   2   3
1   2   3   4
1   2   3   4   5
```

Additional Questions and Answers

Choose the Correct Answer 1 MARK

1. **Which of the following are the executable segments that yield the result?**

(a) Operator (b) Statements
(c) Keywords (d) Identifiers

[Ans. (b) Statements]

2. **Which of the following is used to alter the control flow of the process depending on the state of the process?**

(a) control structure
(b) control statement
(c) program statement
(d) control structure or control statement

[Ans. (d) control structure or control statement]

3. **How many important control structures in python?**

(a) 2 (b) 3
(c) 4 (d) many

[Ans. (b) 3]

4. **Which of the following is not control structures?**

(a) Sequential (b) Branching
(c) Operator (d) Looping

[Ans. (c) Operator]

5. The following statements is an example of
Print ("ONE")
Print ("Four")
(a) iterative (b) branching
(c) sequential (d) looping
[Ans. (c) sequential]

6. What can be learned through alternative or branching statement?
(a) looping
(b) decision making
(c) functions
(d) classes **[Ans. (b) decision making]**

7. Checking whether the given number is even or odd can be done using
(a) sequential
(b) alternative or branching
(c) iterative or looping
(d) iterative or sequential
[Ans. (b) alternative or branching]

8. How many types of alternative or branching statements does python provides?
(a) 3 (b) 4
(c) 2 (d) increase than 3
[Ans. (a) 3]

9. Which of the following is not a type of branching statements?
(a) if (b) if-else
(c) if-elif (d) while
[Ans. (d) while]

10. Which of the following is not a decision making statement?
(a) if (b) if-else
(c) do-while (d) if-elif
[Ans. (c) do-while]

11. Which of the following statement provided control to check the true and false block?
(a) if (b) while
(c) do-while (d) if-else
[Ans. (d) if-else]

12. To construct a chain of if statement, else can be replaced by
(a) while (b) ifel
(c) else if (d) elif **[Ans. (d) elif]**

13. Which of the following can be used when the user wants to execute a block of code several times bill the condition is satisfied?
(a) while (b) if-else
(c) if-elif-if (d) all of there
[Ans. (a) while]

14. Which of the following function generates the list of values starting from start till stop-1 ?
(a) sequence() (b) range()
(c) input() (d) print()
[Ans. (b) range()]

15. range (20), the range count from
(a) 1 to 20 (b) 0 to 19
(c) 1 to 19 (d) 0 to 20
[Ans. (b) 0 to 19]

16. Which of the following statement is correct when the range will start the values from 1 and end at 29?
(a) range (1, 30, 1) (b) range (1, 29, 1)
(c) range (1, 1, 30) (d) range (0, 29, 1)
[Ans. (a) range (1, 30, 1)]

17. Write the output for the following program
for I in range (1, 10, 2):
Print (I, end = ' ')
(a) 1, 3, 5, 7, 9 (b) 1, 3, 5, 7
(c) 1, 3, 5
(d) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
[Ans. (b) 1, 3, 5, 7,]

18. What will be value of s from the following for c in range (1, 5)
s = s + c;
(a) 15 (b) 5 (c) 1 (d) 10
[Ans. (c) 1]

19. Which of the following is not a nested loop?
(a) for within while (b) for within if
(c) while within for
(d) while within while **[Ans. (b) for within it]**

20. Which statement in python used to transfer the center from one part of the program to another unconditionally?
(a) Jump (b) loop
(c) alternative (d) iterative
[Ans. (a) Jump]

21. How many keywords are there to achieve jump statements in python?
(a) 2 (b) 4 (c) 3 (d) 5
[Ans. (c) 3]

22. Which statement transfers the control out of loop even when the loop condition is tested true?
(a) continue (b) break
(c) pass (d) goto
[Ans. (b) break]

23. Which part of the loop is not executed if a loop is left by break?
(a) if (b) else
(c) break (d) for
[Ans. (b) else]

24. Which statement is used to skip the remaining part of a loop and start with next iteration?
(a) continue (b) break
(c) pass (d) condition
[Ans. (a) continue]

25. Which of the following statement is used as a place holder in python?
(a) continue (b) break
(c) pass (d) if [Ans. (c) pass]

CHOOSE ODD MAN OUT

1. (a) Branching (b) looping
(c) sequential (d) Condition
[Ans. (d) Condition]

2. (a) keywords (b) Operator
(c) Identifiers (d) Programs
[Ans. (d) Programs]

3. (a) Statement (b) Operator
(c) Identifier (d) Keyword
[Ans. (a) Statements]

4. (a) continue (b) for
(c) break (d) pass
[Ans. (b) for]

CHOOSE AND FILL IN THE BLANKS

1. The program segment executed based on the test of the condition are called _____
(a) statement (b) iteration
(c) branding (d) looping
[Ans. (c) branding]

2. The program statements executed for multiple times are called _____
(a) alterative (b) looping
(c) branching (d) objects
[Ans. (b) looping]

3. The program statements which are executed one after another is called _____ statements.
(a) sequential (b) iterative
(c) Branching (d) looping
[Ans. (a) sequential]

4. In if-else statement which block is to be executed is determined by a _____
(a) Operator (b) operands
(c) condition (d) identifier
[Ans. (c) condition]

5. Python provides _____types of looping constructs.
(a) 3 (b) 2 (c) 4 (d) 6
[Ans. (b) 2]

6. In the _____loop, the condition is any valid boolean expression returning True or false.
(a) if (b) else
(c) eif (d) while
[Ans. (d) while]

7. The _____part of while is optional part of while.
(a) if (b) else
(c) elif (d) condition
[Ans. (b) else]

8. In Python for loop, the _____refers to the initial, final and increment value.
(a) else (b) sequence
(c) range (d) b or c
[Ans. (d) b or c]

9. In Python, for loop uses the _____ function in the sequence to specify the initial, final and increment values.
(a) Input () (b) print ()
(c) range () (d) sequence ()
[Ans. (c) range ()]

10. **In range (30, 3, -3), -3 denotes _____ value.**
(a) start (b) stop
(c) step (d) final
[Ans. (c) step]

11. **range (30, 3, -3)-will start the range of values from _____and end at_____.**
(a) 30, 3 (b) 30, -3
(c) 30, 6 (d) 30, 0
[Ans. (c) 30, 6]

12. **A loop placed within another loop is called as _____loop structure.**
(a) entry check (b) exit check
(c) nested (d) conditional
[Ans. (c) nested]

13. **Control of the program flows to the statements immediately after the body of the loop by using _____statements.**
(a) continue (b) pass
(c) break (d) goto
[Ans. (c) break]

14. **If break statement is inside a nested loop, _____ will terminate the innermost loop.**
(a) continue (b) Pass
(c) goto (d) break
[Ans. (d) break]

CHOOSE THE CORRECT STATEMENT

1. (i) alternative statement also called branching
(ii) iteration also called branching
(iii) alternative statements also called looping
(iv) branching also called looping
(a) (i) is correct
(b) (ii) and (iv) are correct
(c) (iii) is correct
(d) (i), (ii), (iii) and (iv) are correct
[Ans. (a) (i) is correct]

CHOOSE THE INCORRECT STATEMENT

1. **Which of the following statements are incorrect?**
(i) In a if statement there is no limit of elif clause that can be use(d)
(ii) 'else' clause if used should be placed at the en(d)
(iii) python provides three types of loop constructs.
(iv) if – elif – else is not similar to C++ nested if.
(a) i and ii (b) ii and iii
(c) iii and iv (d) i and iv
[Ans. (c) iii and iv]

2. (i) In for loop, the condition is checked in the beginning.
(ii) In for loop range () function in the resurgence to specify the initial, final and increment values.
(iii) range () generates a list of values starting from start till stop – 1
(iv) The syntax of range is range (start, step, stop)
(a) (i) only
(b) (ii) and (iv)
(c) (iv) only
(d) (i), (ii), (iii) and (iv)
[Ans. (c) (iv) only]

3. (i) Jump statements transfer the control from are part of the program to another conditionally.
(ii) goto, continue, pass are the three jump statements in python.
(iii) In Python, indentation is important in loop and other control statements.
(iv) Pass statement used as a place holder.
(a) i and ii (b) ii and iii
(c) iii and iv (d) i and iv
[Ans. (a) i and ii]

4. (i) if a loop is left by break, the else part is not executed
(ii) Continue statement is used to skip the remaining part of a loop and start with next iteration.
(iii) In python, pass statement is a null statement.
(iv) In python, pass statement is not completely ignored by the complier.
(a) i and ii (b) iii only
(c) iii and iv (d) iv only
[Ans. (d) iv only]

Choose the true or false statement

1. State whether the following statement is true/ false.

(i) While loop is an entry check loop
(ii) for loop is an entry check loop
(iii) print() can have parameters
(iv) if-elif-else is similar to c++ nested if.
(a) i – true, ii – true, iii-true, iv-true
(b) i-true, ii-false, iii-true, iv-true
(c) i-true, ii-true, iii-false, iv-true
(d) i-true, ii-true, iii-true, iv-true

[Ans. (a) i – true, ii – true, iii-true, iv-true]

Very Short Answers 2 MARKS

1. What is meant by alternative or branching?

Ans. There may be situations in our real life programming where we need to skip a segment or set of statements and execute another segment based on the test of a condition. This is called **alternative** or **branching**.

2. Write a program in python to check if the accepted number even or odd.

```
a = int(input("Enter any number :"))
if a%2==0:
    print (a, " is an even number")
else:
    print (a, " is an odd number")
```

Ans. **Output 1:**

Enter any number :56
56 is an even number

Output 2:

Enter any number :67
67 is an odd number

3. Write the syntax of alternative method to write complete if-else.

Ans. **Syntax:**

variable = variable1 if condition else variable 2

4. Write a program in python to check if the accepted number us even or odd (use alternate method of if-else).

Ans.
```
a = int (input("Enter any number :"))
x="even" if a%2==0 else "odd"
print (a, " is ",x)
```

Output 1:

Enter any number :3
3 is odd

Output 2:

Enter any number :22
22 is even

5. Write a note on the parameters used in print () statement.

Ans. **(i)** **print** can have end, sep as parameters. end parameter can be used when we need to give any escape sequences like '\t' for tab, '\n' for new line and so on.

(ii) sep as parameter can be used to specify any special characters like, (comma) ; (semicolon) as separator between values

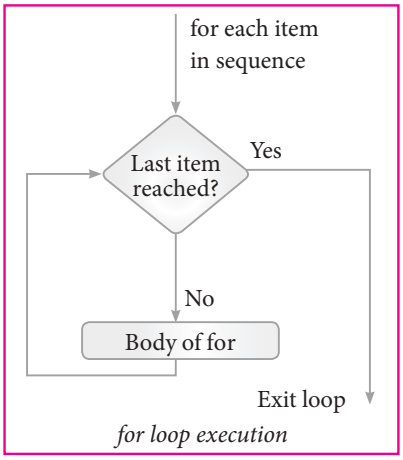
6. Write the syntax of for loop.

Ans. **Syntax:**

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

7. Draw the flowchart that illustrate the working of for loop.

Ans.



for loop execution

8. What will the output of the following program?

```
for i in range (1, 9, 2):
    print (i, end = '  ')
else:
    print (")n End of the loop")
```

Ans. **Output:**

1, 3, 5, 7
End of the loop

9. What is the expression or statement at ?1? and ?2? in the following program to get the output 2 4 6 8

```
for ?1? in range (2, ?2?, 2):
    print (i, end = '')
```

Ans. ?1? – i
?2? – 10

10. Write a python program to calculate the sum of numbers between 1 and 100.

Ans. Program to calculate the sum of numbers 1 to 100

Program :

```
n = 100
sum = 0
for counter in range(1,n+1):
    sum = sum + counter
print("Sum of 1 until %d: %d" % (n,sum))
```

Output:

Sum of 1 until 100: 5050

11. Write a python program to find the sum of even numbers between 1 and 10.

Ans.

```
s = 0
For i in range (2, 11, 2)
s = s + i
print (s)
```

12. Write a python program to find the sum of odd numbers between 10 and 20.

Ans.

```
s = 0
for i in range (11, 21, 2)
s = s + i
print (s)
```

13. What are the values taken by range ()?

Ans. It take values from string, list, dictionary.

14. What is meant by Nested loop structure?

Ans. A loop placed within another loop is called as nested loop structure. A **while** within another **while; for** within another **for; for** within **while** and **while** within **for** to construc nested loops.

15. What is the use of Jump statements in python?

(or)

What are the statements are there to achieve jump statements in python?

Ans. The jump statement in Python, is used to unconditionally transfer the control from one part of the program to another. There are three keywords to achieve jump statements in Python: break, continue, pass. The following flowchart illustrates the use of break and continue.

16. Write the syntax how break statement used in for loop.

Ans.

```
for var in sequence:
    if condition:
        break
    #code inside for loop
#code outside for loop
```

17. Write the syntax how break statement used in while loop.

Ans.

```
while test expression:
    #code inside while loop
    if condition:
        break
    #code inside while loop
#code outside while loop
```

18. What is the use of continue statement in python?

Ans. Continue statement unlike the break statement is used to skip the remaining part of a loop and start with next iteration.

19. What will the output the following

```
for w in "school"?
If w = = '0':
        continue
print (w)
```

Ans. schl

20. Write a note an pass statement.

Ans. **pass** statement in Python programming is a null statement. pass statement when executed by the interpreter it is completely ignored. Nothing happens when pass is executed, it results in no operation.

SHORT ANSWERS — 3 MARKS

1. Write a note on sequential statement with an example.

Ans. A sequential statement is composed of a sequence of statements which are executed one after another. A code to print your name, address and phone number is an example of sequential statement.

Example :

```
# Program to print your name and address - example for sequential statement
print ("Hello! This is Shyam")
print ("43, Second Lane, North Car Street, TN")
```

Output :

Hello! This is Shyam
43, Second Lane, North Car Street, TN

2. List the types of alternative or branching statement in python.

Ans. Python provides the following types of alternative or branching statements:

(i) Simple if statement
(ii) if..else statement
(iii) if..elif statement

3. Write a python program to print all numbers from 10 to 15 using while loop.

Ans. **Example :** Program to illustrate the use of while loop - to print all numbers from 10 to 15

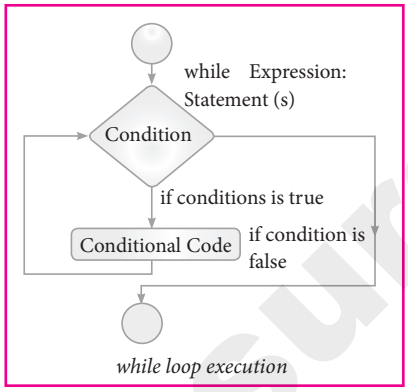
```
i=10 # intializing part of the control variable
while (i<=15): # test condition
print (i,end='\t') # statements - block 1
i=i+1 # Updation of the control variable
```

Output:

10 11 12 13 14 15

4. Draw a flowchart that illustrates the working of while loop.

Ans.



while loop execution

5. Write a program in python that illustrate the use of 'in' and 'not in' if statement

Ans. **Program :**

```
ch=input ("Enter a character :")
# to check if the letter is vowel
if ch in ('a', 'A', 'e', 'E', 'i', 'I', 'o', 'O', 'u', 'U'):
    print (ch,' is a vowel')
# to check if the letter typed is not 'a' or 'b' or 'c'
if ch not in ('a', 'b', 'c'):
    print (ch,' the letter is not a/b/c')
```

Output 1:

```
Enter a character :e
e is a vowel
```

Output 2:

```
Enter a character :x
x the letter is not a/b/c
```

6. Write the syntax of working of continue statement in for and while loop.

Ans.

```
for var in sequence:
# code inside for loop
if condition:
    continue
    #code inside for loop
    #code outside for loop
while test expression:
#code inside while loop
if condition:
    continue
    #code inside while loop
    #code outside while loop
```

7. What is the output of the following Python program?

Ans.

```
i=10 # intializing part of the control variable
while (i<=15): # test condition
print (i,end='\t') # statements - block 1
i=i+1 # Updation of the control variable
else:
print ("\nValue of i when the loop exit ",i)
```

Output: 1

10 11 12 13 14 15
Value of i when the loop exit 16

8. Draw a flowchart that illustrate how looping construct gets executed.

Ans.

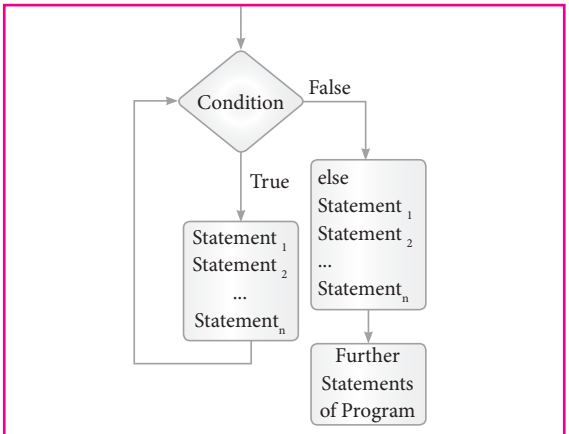


Diagram to illustrate how looping construct gets executed

9. What will be output of the following program?

Ans.

```
for word in "Jump Statement":
    if word = = "e":
        break
        print (word, end='')
else:
        print ("End of the loop")
        print ("\n End of the program")
```

Output:
Jump Stat
End of the program

10. Why we need to construct the pass statement?

Ans. **pass** statement is generally used as a placeholder. When we have a loop or function that is to be implemented in the future and not now, we cannot develop such functions or loops with empty body segment because the interpreter would raise an error. So, to avoid this we can use pass statement to construct a body that does nothing.

LONG ANSWERS — 5 MARKS

1. Write a program in python to display he following output

1
2 2
3 3 3
4 4 4 4
5 5 5 5 5

Ans.
```
for i in range (1,6):
    for j in range (1, i + 1)
        print (i, end = '  ')
        print (end = '\n')
    i + = 1
```

2. Write a program in python to display the following output.

(i) **5 5 5 5 5**
4 4 4 4
3 3 3
2 2
1

(ii) **1 2 3 4 5**
1 2 3 4
1 2 3
1 2
1

Ans. **(i)**
```
for i in range (5, 0,-1):
    for j in range (1, i + 1):
        print (i, end = '  ')
        print (end = '\n')
    i + = 1
```

(ii)
```
for i in range (5, 0, -1):
        for j in range (1, i + 1):
        print (j end = '  ')
        print (i, end = '\n')
    i + = 1
```

☆☆☆

CHAPTER 7

PYTHON FUNCTIONS

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

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
[Ans. (c) Function]

2. A Function which calls itself is called as
(a) Built-in (b) Recursion
(c) Lambda (d) return
[Ans. (b) Recursion]

3. Which function is called anonymous un-named function
(a) Lambda (b) Recursion
(c) Function (d) define
[Ans. (a) Lambda]

4. Which of the following keyword is used to begin the function block?
(a) define (b) for
(c) finally (d) def
[Ans. (d) def]

5. Which of the following keyword is used to exit a function block?
(a) define (b) return
(c) finally (d) def
[Ans. (b) return]

6. While defining a function which of the following symbol is used.
(a) ; (semicolon) (b) . (dot)
(c) : (colon) (d) $ (dollar)
[Ans. (c) : (colon)]

7. In which arguments the correct positional order is passed to a function?
(a) Required (b) Keyword
(c) Default (d) Variable-length
[Ans. (a) Required]

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
[Ans. (a) I is correct and II is 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
[Ans. (b) x%4==0]

10. Which of the following keyword is used to define the function testpython(): ?
(a) define (b) pass
(c) def (d) while
[Ans. (c) def]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. What is function?

Ans. **(i)** Functions are named blocks of code that are designed to do one specific job.
(ii) Types of Functions are User defined, Built-in, lambda and recursion.
(iii) Function blocks begin with the keyword "def" followed by function name and parenthesis ().

2. Write the different types of function. *[PTA-3]*

Ans. **(i)** User - defined functions.
(ii) Built in functions.
(iii) Lambda functions.
(iv) Recursion functions.

3. What are the main advantages of function? *[HY-2019]*

Ans. Main advantages of functions are
(i) It avoids repetition and makes high degree of code reusing.
(ii) It provides better modularity for your application.

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

Ans. Scope of variable refers to the part of the program, where it is accessible, i.e., area where the variables can refer (use). The scope holds the current set of variables and their values. The two types of scopes are - **local scope and global scope**.

5. Define global scope.

Ans. 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.

6. What is base condition in recursive function? *[PTA-6]*

Ans. **(i)** A recursive function calls itself.

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

(iii) A base condition is must in every recursive function otherwise it will continue to execute like an infinite loop.

7. How to set the limit for recursive function? Give an example. *[PTA-5]*

Ans. **(i)** Python stops calling recursive function after 1000 calls by default.

(ii) So, it also allows you to change the limit using sys.setrecursionlimit (limit_value).

Example:

```
import sys
sys.setrecursionlimit(3000)
def fact(n):
    if n == 0:
    return 1
    else:
    return n * fact(n-1)
print(fact (2000))
```

PART - III

ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. Write the rules of local variable.

Ans. **Rules of local variable :**

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

(ii) When a variable is created inside the function/block, the variable becomes local to it.

(iii) A local variable only exists while the function is executing.

(iv) The formate arguments are also local to function.

2. Write the basic rules for global keyword in python. *[PTA-4]*

Ans. **Rules of global Keyword :** The basic rules for **global** keyword in Python are:

(i) When we define a variable outside a function, it's global by default. You don't have to use global keyword.

(ii) We use global keyword to read and write a global variable inside a function.

(iii) Use of global keyword outside a function has no effect.

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

Ans. If we modify the global variable, we can see the change on the global variable outside the function also.

Example:

```
x = 0                                   # global variable
def add():
    global x
    x = x + 5                           # increment by 2
  print ("Inside add() function x value is :", x)
add()
print ("In main x value is :", x)
```

Output :

```
Inside add() function x value is : 5
In main x value is : 5          # value of x changed
                                  outside the function
```

4. Differentiate ceil() and floor() function.

Ans. *[PTA-2]*

S.No.	ceil ()	floor ()
(i)	Returns the smallest integer greater that or equal to x.	Returns the largest integer less than or equal to x.
(ii)	Syntax : math.ceil(x)	Syntax : math.floor(x)

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

Ans. **Code :**

```
n=int(input("Enter the year"))
if(y%4==0):
    print ("Leap Year")
else:
    print ("Not a Leap Year")
```

Output :

```
Enter the year      2012
Leap Year
```

6. What is composition in functions?

Ans. **(i)** The value returned by a function may be used as an argument for another function in a nested manner.

(ii) This is called **composition**. For example, if we wish to take a numeric value or an expression as a input from the user, we take the input string from the user using the function **input()** and apply **eval()** function to evaluate its value

7. How recursive function works?

Ans. (i) Recursive function is called by some external code.

(ii) If the base condition is met then the program gives meaningful output and exits.

(iii) Otherwise, function does some required processing and then calls itself to continue recursion.

8. What are the points to be noted while defining a function? *[Govt. MQP-2019]*

Ans. When defining functions there are multiple things that need to be noted;

(i) Function blocks begin with the keyword **"def"** followed by function name and parenthesis ().

(ii) Any input parameters or arguments should be placed within these parentheses when you define a function.

(iii) The code block always comes after colon(;) and is indented.

(iv) 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.

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. Explain the different types of function with an example. *[Govt. MQP-2019; PTA-4]*

Ans. Functions are named blocks of code that are designed to do one specific job.

Types of Functions :

(i) User Defined Function
(ii) Built-in Function
(iii) Lambda Function
(iv) Recursion Function

(i) User Defined Function :

- Functions defined by the users themselves are called user defined function.
- Functions must be defined to create and use certain functionality.
- Function blocks begin with the keyword "def" followed by function name and parenthesis ().

Example :

```
def area(w,h):
        return w * h
print (area (3,5))
```

(ii) Built-in Functions : Functions which are using Python libraries are called Built-in function.

```
x=20
y=-23.2
print('x = ', abs(x))
print('y = ', abs(y))
```

Output:

```
x = 20
y = 23.2
```

(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.

Example :

```
sum = lambda arg1, arg2: arg1 + arg2
print ('The Sum is '", sum(30,40))
pint ('The Sum is :', sum(–30,40))
```

Output :

```
The Sum is : 70
The Sum is : 10
```

(iv) Recursive function : Functions that calls itself is known as recursive.

Overview of how recursive function works :

(i) Recursive function is called by some external code.

(ii) If the base condition is met then the program gives meaningful output and exits.

(iii) 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))
```

Output:

```
1
120
```

2. Explain the scope of variables with an example. *[PTA-3; HY-2019]*

Ans. Scope of variable refers to the part of the program, where it is accessible, i.e., area where the variables refer (use). The scope holds the current set of variables and their values. The two types of scopes - local scope and global scope.

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

Rules of local variable :

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

(ii) When a variable is created inside the function/block, the variable becomes local to it.

(iiii) A local variable only exists while the function is executing.

(iv) The formal arguments are also local to function.

(v) **Example:** Create a Local Variable

```
def loc():
        y=0 # local scope
        print(y)
loc()
```

Output:

```
0
```

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.

Rules of global Keyword :

The basic rules for global keyword in Python are:

(i) When we define a variable outside a function, it's global by default. You don't have to use global keyword.

(ii) We use global keyword to read and write a global variable inside a function.

(iii) Use of global keyword outside a function has no effect.

Example : Accessing global Variable From Inside a Function

```
c = 1     # global variable
def add():
        print(c)
        add()
```

Output:

```
1
```

3. Explain the following built-in functions.

(a) id() (b) chr()

(c) round() (d) type()

(e) pow()

Ans.

(a) *[PTA-4, 6; QY-2019]*

Function	Description	Syntax	Example
id ()	id( ) Return the "identity" of an object. i.e. the address of the object in memory. **Note:** The address of x and y may differ in your system.	id (object)	x=15 y='a' print ('address of x is :',id (x)) print ('address of y is :',id (y)) **Output:** address of x is : 1357486752 address of y is : 13480736

(b) *[PTA-4]*

Function	Description	Syntax	Example
chr ( )	Returns the Unicode character for the given ASCII value. This function is inverse of ord() function.	chr (i)	c=65 d=43 print (chr (c)) prin t(chr (d)) **Output:** A +

(c)

Function	Description	Syntax	Example
round ( )	Returns the nearest integer to its input. 1. First argument (number) is used to specify the value to be rounded.	round (number [,ndigits])	x= 17.9 y= 22.2 z= -18.3 print ('x value is rounded to', round (x)) print ('y value is rounded to', round (y)) print ('z value is rounded to', round (z))

(d) *[PTA-4; QY-2019]*

Function	Description	Syntax	Example
type ( )	Returns the type of object for the given single object. **Note:** This function used with single object parameter.	type (object)	x= 15.2 y= 'a' s= True print (type (x)) print (type (y)) print (type (s)) **Output:** <class 'float'> <class 'str'> <class 'bool'>

(e)

Function	Description	Syntax	Example
pow ( )	Returns the computation of ab i.e. (a**b) a raised to the power of b.	pow (a,b)	a= 5 b= 2 c= 3.0 print (pow (a,b)) print (pow (a,c)) print (pow (a+b,3)) **Output:** 25 125.0 343

4. Write a Python code to find the L.C.M. of two numbers.

Ans. **Program :**

```
def lcm(x, y):
if x>y:
    greater = x
else:
    greater = y
while (True):
    if ((greater % x == 0) and (greater % y == 0)):
    lcm = greater
    break
    greater + = 1
    return lcm
a = int (input ("Enter first number :"))
b = int (input ("Enter second number :"))
print ("The LCM of ", a, "and", b, "is", LCM(a,b))
```

5. Explain recursive function with an example. *[PTA-5]*

Ans.

(i) A Functions that calls itself is known as recursive.

(ii) When a function calls itself is known as recursion.

(iii) Recursion works like loop but sometimes it makes more sense to use recursion than loop.

(iv) Imagine a process would iterate indefinitely if not stopped by some condition is known as infinite iteration.

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

(vi) A base condition is must in every recursive function otherwise it will continue to execute like an infinite loop.

(vii) Python stops calling recursive function after 1000 calls by default.

(viii) So, It also allows you to change the limit using sys.setrecursionlimit (limit_value).

Overview of how recursive function works :

(i) Recursive function is called by some external code.

(ii) If the base condition is met then the program gives meaningful output and exits.

(iii) Otherwise, function does some required processing and then calls itself to continue recursion.

Here is an example of recursive function used to calculate factorial.

Example :

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

Output:

1

HANDS ON PRACTICE

1. Try the following code in the above program.

Sl.No.	Code	Result
1.	printinfo("3500")	
2.	printinfo("3500","Sri"))	
3.	printinfo(name="balu")	
4.	printinfo("Jose", 1234)	
5.	printinfo(" ",salary=1234)	

Ans. **Output :**

1. Error
2. Name : Sri
   Salary : 3500
3. Name : Balu
   Salary : 3500
4. Name : Jose
   Salary : 1234
5. Name :
   Salary : 1234

2. Evaluate the following functions and write the output.

Sl.No.	Function	Output
1.	eval('25*2-5*4')	
2.	math.sqrt(abs(-81)	
3.	math.ceil(3.5+4.6)	
4.	math.floor(3.5+4.6)	

Ans. **Output :**

1. 30
2. 9
3. 8
4. 9

3. Evaluate the following functions and write the output.

Sl.No.	function	Output
1.	1. abs (-25+12.0) 2. abs (-3.2)	
2.	1. ord('2) 2. ord($')	
3.	type('s')	
4.	bin(16)	
5.	1. chr(13) 2. print(chr(13))	
6.	1. round(18.2,1) 2. round(18.2,0) 3. round(0.5100,3) 4. round(0.5120,3)	
7.	1. format(66, 'c') 2. format(10, 'x') 3. format(10, 'X') 4. format(0b110, 'd') 5. format(0xa, 'd')	
8.	1. pow(2,-3) 2. pow(2,3.0) 3. pow(2,0) 4. pow(1+2),2) 5. pow(-3,2) 6. pow(2*2,2)	

Ans. **Output :**

1. 1. 13
   2. 3.2
2. 1. 50
   2. 36
3. <class 'str'>
4. 0b10000
5. 1. CR (carriage return)
   2. It moves the cursor to the beginning of same line
6. 1. 18.2
   2. 18.0
   3. 0.510
   4. 0.512
7. 1. B
   2. a
   3. A
   4. 6
   5. 10
8. 1. 0.125
   2. 8.0
   3. 1

PTA Questions and Answers

1 MARK

1. Which function is called anonymous function? *[PTA-1]*

(a) Lambda (b) Recursion
(c) Function (d) define

[Ans. (a) Lambda]

2. Which of the following special character is used to define variable length arguments? *[PTA-2]*

(a) & (b) $ (c) * (d) #

[Ans. (c) *]

3. Which keyword to be used to define a function in Python? *[PTA-3]*

(a) def (b) local
(c) rec (d) global

[Ans. (a) def]

4. Non-keyword variable arguments are called as *[PTA-4]*

(a) Sets (b) List
(c) Tuples (d) Dictionary

[Ans. (c) Tuples]

5. What will be the output of the following Python snippet? *[PTA-5]*

```
c=5
def add():
    c=c+5
    print(c)
add()
```

(a) 5 (b) 10
(c) 15 (d) Error

[Ans. (d) Error]

6. Which of the following is not an argument type? *[PTA-6]*

(a) Required arguments
(b) Default arguments
(c) Keyword arguments
(d) Fixed length arguments

[Ans. (d) Fixed length arguments]

2 MARKS

1. Write the syntax of creating User Defined Function in Python. *[PTA-1]*

Ans. **Syntax for User defined function :**

```
def <function_name ([parameter1,
                    parameter2…] )> :
<Block of Statements>
return <expression / None>
```

2. What is the use of lambda function? *[PTA-2]*

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

5 MARKS

1. Explain about Lambda function with suitable example. *[PTA-2]*

Ans. 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.

(i) Lambda function is mostly used for creating small and one-time anonymous function.

(ii) Lambda functions are mainly used in combination with the functions like filter(), map() and reduce ().

Syntax of Anonymous Functions

The syntax for anonymous functions is as follows:

Example :

```
lambda [argument(s)] :expression
sum = lambda arg1, arg2: arg1 + arg2
print ('The Sum is :', sum(30,40))
print ('The Sum is :', sum(-30,40))
```

Output :

```
The Sum is : 70
The Sum is : 10
```

The above lambda function that adds argument arg1 with argument arg2 and stores the result in the variable sum. The result is displayed using the print().

Government Exam Questions and Answers

1 MARK

1. The bin() function returns a binary string prefixed with: *[Govt. MQP-2019]*

(a) 0 (b) 1 (c) 0b (d) 1b

[Ans. (c) 0b]

2. **What is the output of the following program:** *[QY-2019]*

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

(a) 1 (b) 0
(c) none (d) C

[Ans. (a) 1]

3. **What is the output of the function Print (Chr(66))?** *[QY-2019]*

(a) A (b) C
(c) b (d) B

[Ans. (d) B]

4. **Evaluate the following function and write the output.** *[HY-2019]*

```
x = –37.9
print(math.cell(x))
```

(a) –38 (b) –39
(c) –36 (d) –37

[Ans. (d) –37]

2 MARKS

1. **Define Operator and Operand.**

[Govt. MQP-2019]

Ans. Operators are categorized as Arithmetic, Relational, Logical, Assignment etc. Value and variables when used with operator are known as operands.

2. **Define short notes on floor division operator.** *[QY-2019]*

Ans. **floor ( )** - Returns the largest integer less than or equal to x

Syntax : math.floor (x)

```
x=26.7
y=-26.7
z=-23.2
print (math.floor (x))
print (math.floor (y))
print (math.floor (z))
```

Output:

26
-27
-24

3. **Describe the abs() and chr() function.** *[QY-2019]*

Ans. **abs ( )** - Returns absolute value of a number
chr ( ) - Returns a Character (a string) from an Integer

3 MARKS

1. **Evaluate the following function.** *[QY-2019]*

a) **math.ceil (3.5)** b) **abs (–3.2)**
c) **Pow (2, 0)**

Ans. **a)** math.ceil (3.5) = 4
b) abs (–3.2) = 3.2
c) Pow (2,0) = 1

2. **What is the use of format () function? Give an example.** *[QY-2019]*

Ans.

Function	Description	Syntax	Example
format ( )	Returns the output based on the given format 1. Binary format. Outputs the number in base 2. 2. Octal format. Outputs the number in base 8. 3. Fixed-point notation. Displays the number as a fixed-point number. The default precision is 6.	format (value [, format_spec])	x= 14 y= 25 print ('x value in binary :',format(x,'b')) print ('y value in octal :',format(y,'o')) print('y value in Fixed-point no ',format(y,'f')) **Output:** x value in binary : 1110 y value in octal : 31 y value in Fixed-point no : 25.000000

5 MARKS

1. Explain various function arguments in Python. *[QY-2019]*

Ans. **Required Arguments :**

(i) "Required Arguments" are the arguments passed to a function in correct positional order. Here, the number of arguments in the function call should match exactly with the function definition. Atleast one parameter to prevent syntax errors to get the required output.

(ii) **Example :**

```
def printstring(str):
        print ("Example - Required arguments")
        print (str)
        return
# Now you can call printstring() function
printstring ("Welcome")
```

Output:

```
Example - Required arguments
Welcome
```

(iii) When the above code is executed, it produces the following error.

```
Traceback (most recent call last):
File "Req-arg.py", line 10, in <module>
printstring()
TypeError: printstring() missing 1 required positional argument: 'str'
```

(iv) Instead of printstring() in the above code if we use printstring ("Welcome") then the output is

Output:

```
Example - Required arguments
Welcome
```

Keyword Arguments :

(i) Keyword arguments will invoke the function after the parameters are recognized by their parameter names. The value of the keyword argument is matched with the parameter name and so, one can also put arguments in improper order (not in order).

(ii) **Example :**

```
def printdata (name):
        print ("Example-1 Keyword arguments")
        print ("Name :",name)
        return
# Now you can call printdata() function
printdata(name = "Gshan")
```

(iii) When the above code is executed, it produces the following output :

Output:

```
Example-1 Keyword arguments
Name :Gshan
```

Default Arguments :

(i) In Python the default argument is an argument that takes a default value if no value is provided in the function call. The following example uses default arguments, that prints default salary when no argument is passed.

(ii) **Example :**

```
def printinfo( name, salary = 3500):
        print ("Name: ", name)
        print ("Salary: ", salary)
        return
printinfo("Mani")
```

(iii) When the above code is executed, it produces the following output

Output:

```
Name: Mani
Salary: 3500
```

(iv) When the above code is changed as print info("Ram",2000) it produces the following output:

Output:

```
Name: Ram
Salary: 2000
```

Syntax - Variable-Length Arguments :

(i)

```
def function_name(*args):
        function_body
        return_statement
```

(ii) **Example :**

```
def printnos (*nos):
        for n in nos:
        print(n)
        return
# now invoking the printnos() function
print ('Printing two values')
printnos (1,2)
print ('Printing three values')
printnos (10,20,30)
```

Output :

```
Printing two values
        1
        2
Printing three values
        10
        20
        30
```

Additional Questions and Answers

Choose the Correct Answer 1 MARK

1. Which of the following is used, if you don't need to type all the python code for the same task again and again:
(a) Statement (b) Function
(c) Scope
(d) Control structures [Ans. (b) Function]

2. Which of the following avoids repetition and makes high degree of code reusing?
(a) Loop (b) Branching
(c) Functions (d) Dictionaries
[Ans. (c) Functions]

3. Which of the following provides better modularity for your python application
(a) function (b) tuples
(c) dictionaries (d) control structures
[Ans. (a) function]

4. How many types of functions are there in python?
(a) 3 (b) 4 (c) 2 (d) 5
[Ans. (b) 4]

5. Functions that calls itself are known as
(a) User defined (b) Recursive
(c) Built- in (d) Lambda
[Ans. (b) Recursive]

6. Which of the following is not a type of function in python?
(a) Control (b) Lambda
(c) Recursion (d) Built in
[Ans. (a) Control]

7. Which of the following statement exits a function?
(a) Exit (b) Def
(c) Return (d) None of these
[Ans. (c) Return]

8. In Python, statement in a block are written with
(a) Function (b) Identification
(c) Recursion (d) Parameters
[Ans. (b) Identification]

9. Which of the following are treated as one big sequence of statement while exection?
(a) Structure (b) Statement
(c) Block (d) Code
[Ans. (c) Block]

10. What will be the output if the return has no argument?
(a) No (b) Return
(c) None (d) End
[Ans. (c) None]

11. Which of the following are the values pass to the function parameters?
(a) Variables (b) Arguments
(c) Definitions (d) Identifiers
[Ans. (b) Arguments]

12. How many types of arguments are used to call a function ?
(a) 3 (b) 4 (c) 5 (d) 2
[Ans. (b) 4]

13. Which of the following is not a type of arguments used to call a function?
(a) Required (b) Keywords
(c) Default (d) Module
[Ans. (d) Module]

14. In which of the following the number of arguments in the function call should match exactly with the function definition?
(a) Required arguments
(b) Keyword arguments
(c) Default arguments
(d) Variable-length arguments
[Ans. (a) Required arguments]

15. In which of the following will invoke the functions after the parameters are recognized by their parameters names?
(a) Required arguments
(b) Keyword arguments
(c) Default arguments
(d) Variable-length arguments
[Ans. (c) Default arguments]

16. Which arguments are used when more arguments are passed that have already been specified?
(a) Keyword (b) Default
(c) Required (d) Variable-length
[Ans. (d) Variable-length]

17. Which of the following functions is an example that supports variable-length arguments?
(a) While (b) If
(c) Print () (d) Input()
[Ans. (c) Print ()]

18. Which function can take any number of arguments and must return one value in the form of an expression?
(a) user defined (b) recursive
(c) lambda (d) default
[Ans. (c) lambda]

19. Which function is mostly used for creating small and one time anonymous function?
(a) Synchronous (b) Lambda
(c) User-defined (d) Built-in
[Ans. (b) Lambda]

20. Predict the output of the following code
```
x = lambda y, z : y + z
print (10,15)
```
(a) 10 (b) 15
(c) 25 (d) 1025
[Ans. (c) 25]

21. Which of the following statement causes your function to exit?
(a) break (b) pass
(c) print (d) return
[Ans. (d) return]

22. How many return statement is executed at runtime?
(a) 2 (b) 1
(c) 3 (d) multiple
[Ans. (b) 1]

23. How many number of return statement allowed in a function definition?
(a) only one (b) only 2
(c) only 4 (d) multiple
[Ans. (d) multiple]

24. Which of the following holds the current set of variables and their values?
(a) scope (b) Identifiers
(c) operators (d) functions
[Ans. (a) scope]

25. How many types of scopes in Python?
(a) 3 (b) 4
(c) 2 (d) many [Ans. (c) 2]

26. What is the output for the following code
```
def loc() :
        y = "2"
loc()
print (y)
```
(a) loc() (b) 2
(c) y (d) error
[Ans. (d) error]

27. Defining a variable outside a function, its _ by default.
(a) local (b) global
(c) function (d) operands
[Ans. (b) global]

28. Write the output for the following code:
```
c = 1
def add():
        c = c + 3
        print (c)
add()
```
(a) 1 (b) 4
(c) 3 (d) error
[Ans. (d) error]

29. Write the output for the following code
```
a = 5
def add():
        a = 10
add ()
print (a)
```
(a) 5 (b) 10
(c) 15 (d) error [Ans. (a) 5]

30. Write the output for the following code
```
a = 5
def add ():
        a = 10
        print (a)
add ()
```
(a) 5 (b) 10
(c) 15 (d) error
[Ans. (b) 10]

31. print (abs (-23.2)) displays
(a) –23 (b) –23.2
(c) 23.2 (d) 0.2
[Ans. (c) 23.2]

32. print (ord('A') displays
(a) 65 (b) A (c) a (d) 97
[Ans. (a) 65]

33. print (ord('a') displays
(a) 65 (b) A (c) –a (d) 97
[Ans. (d) 97]

34. Print (chr(65)) displays
(a) 65 (b) A (c) a (d) c65
[Ans. (b) A]

35. print (chr(43)) displays
(a) + (b) – (c) A (d) a
[Ans. (a) +]

36. Print (bin(5)) displays
(a) 5 (b) 101
(c) 0b101 (d) 1010b
[Ans. (c) 0b101]

37. Which function is inverse of chr () function?
(a) type () (b) id ()
(c) formula () (d) ord ()
[Ans. (d) ord ()]

38. Which function is an alternative to bin ()?
(a) id () (b) format ()
(c) type () (d) chr ()
[Ans. (b) format ()]

39. print (type ('a')) displays
(a) <class 'char'> (b) <class 'bool'>
(c) <class 'slr'> (d) <class 'string'>
[Ans. (c) <class 'slr'>]

40. Which of the following function return the address of the object in memory?
(a) address () (b) object ()
(c) id () (d) format ()
[Ans. (c) id ()]

41. print (format (25, '0') displays
(a) 25 (b) 025 (c) 31 (d) 031
[Ans. (c) 31]

42. The default presidium of fixed point constant is
(a) 7 (b) 6 (c) 8 (d) 16
[Ans. (b) 6]

43. print (format (14, 'f') displays
(a) 14.00 (b) 14
(c) 14.0000 (d) 14.000000
[Ans. (d) 14.000000]

44. print (round (17.89, 1) displays
(a) 18 (b) 181
(c) 17.9 (d) 18.0
[Ans. (c) 17.9]

45. pow (5, 2) is equivalent to
(a) 5 * 2 (b) 5 * * 2
(c) 2 * * 5 (d) 2 * 5
[Ans. (b) 5 * * 2]

46. Which of the following function returns the computation of a * * b?
(a) pow () (b) id ()
(c) format () (d) type ()
[Ans. (a) pow ()]

47. Which of the following function returns the smallest integer greater than or equal to x?
(a) floor () (b) round ()
(c) pow () (d) ceil ()
[Ans. (d) ceil ()]

MATCH THE FOLLOWING

1.				
	i)	round ( )	1.	nearest integer
	ii)	sum ( )	2.	total value
	iii)	id ( )	3.	identity of the object
	iv)	type ( )	4.	type of the object

	(i)	(ii)	(iii)	(iv)
(a)	1	2	3	4
(b)	1	2	4	3
(c)	2	1	3	4
(d)	2	1	4	3

[Ans. (a) (i)-1; (ii)-2; (iii)-3; (iv)-4]

2.				
	i)	Required Arguments	1.	arguments is improper order
	ii)	Keyword Arguments	2.	asterisk symbol
	iii)	Default arguments	3.	Correct Positional order
	iv)	Variable length arguments	4.	default value

	(i)	(ii)	(iii)	(iv)
(a)	1	2	3	4
(b)	4	3	2	1
(c)	3	1	4	2
(d)	4	2	1	3

[Ans. (c) (i)-1; (ii)-2; (iii)-3; (iv)-4]

Choose odd man out

1. (a) User defined (b) Built in
(c) Recursion (d) Parameters
[Ans. (d) Parameters]

2. (a) filter ( ) (b) map ( )
(c) print ( ) (d) reduce ( )
[Ans. (c) print ( )]

3. (a) ceil ( ) (b) floor ( )
(c) type ( ) (d) round ( )
[Ans. (c) type ( )]

4. (a) min ( ) (b) max ( )
(c) round ( ) (d) bin ( )
[Ans. (d) bin ( )]

5. (a) ord ( ) (b) chr ( )
(c) id ( ) (d) bin ( )
[Ans. (c) id ( )]

Choose and fill in the blanks

1. **_____ makes your program easier to write, read, test and fix errors.**
(a) Functions (b) List
(c) Tuples (d) Loops
[Ans. (a) Functions]

2. **A group of related statement that perform a specific task is called as _____**
(a) Lists (b) Tuples
(c) Control statements (d) Functions
[Ans. (d) Functions]

3. **Functions that are anonymous in named function are called _____**
(a) User defined (b) Built-in
(c) Lambda (d) Recursive
[Ans. (c) Lambda]

4. **Function blocks begins with the keyword _____**
(a) Fun (b) Definition
(c) Def (d) Function
[Ans. (c) Def]

5. **Functions identified by function name and _____**
(a) [] (b) () (c) {} (d) <>
[Ans. (b) ()]

6. **Python _____ should not be used as function name.**
(a) Identifiers (b) Operators
(c) Variables (d) Keywords
[Ans. (d) Keywords]

7. **While defining syntax, the text which is given in _____ is optional**
(a) () (b) <> (c) [] (d) {}
[Ans. (c) []]

8. **A block within a block is called _____block.**
(a) Nested (b) Compressed
(c) Control (d) Called
[Ans. (a) Nested]

9. **If there is no return statement present inside the function, then the function will return _ _____ object.**
(a) No (b) Nothing
(c) None (d) def
[Ans. (c) None]

10. **_____of variable refers to the part of the program, where it is accessible.**
(a) return (b) scope
(c) definition (d) argument
[Ans. (b) scope]

11. **A_____ variable declared inside the function's body is known as**
(a) file scope (b) function scope
(c) global scope (d) local scope
[Ans. (d) local scope]

12. **The _____arguments are also local to function**
(a) default (b) keyword
(c) format (d) variable-length
[Ans. (c) format]

13. **_____ helps us to define a program into modules.**
(a) Functions (b) Sub programs
(c) Routines (d) Recursion
[Ans. (a) Functions]

14. **_____ are variables used in the function definition**
(a) Arguments (b) Identifiers
(c) Structures (d) Parameters
[Ans. (d) Parameters]

15. In _____ arguments, one can put arguments in improper order.
(a) Default (b) Keyword
(c) Required
(d) Variable length arguments
[Ans. (b) Keyword]

16. In python the _____ arguments is an arguments that takes a default values if no value is provide in function call
(a) Default (b) Keyword
(c) Required
(d) Variable length arguments
[Ans. (a) Default]

17. In variable length arguments we can pass the arguments using _____ methods.
(a) Three (b) Four
(c) Two (d) Six
[Ans. (c) Two]

18. When a variable is created inside the _____, the variable becomes local to it.
(a) program (b) function
(c) block (d) global
[Ans. (b) function]

19. A____ variable only exists while the function is executing.
(a) global (b) local
(c) file (d) function
[Ans. (b) local]

20. _____ function can only access global variables.
(a) user-defined (b) anonymous
(c) recursive (d) return
[Ans. (b) anonymous]

21. In python _____ function is a function that is defined without a name.
(a) Anonymous (b) Recursive
(c) User defined (d) Default
[Ans. (a) Anonymous]

22. The _____ keyword used to read and write a global variable inside a function.
(a) global (b) local
(c) return (d) def
[Ans. (a) global]

23. The_____function is inverse of ord () function.
(a) id () (b) bin ()
(c) chr () (d) none of these
[Ans. (c) chr ()]

24. _____ works like loop.
(a) Function (b) Recursion
(c) Composition (d) Specification
[Ans. (b) Recursion]

25. You can convert any loop to _____.
(a) Recursion (b) Composition
(c) Function (d) Branching
[Ans. (a) Recursion]

26. _____ is applied in any recursive function is known as base condition.
(a) Finite iteration
(b) Default arguments
(c) Keyword arguments
(d) Infinite iteration
[Ans. (d) Infinite iteration]

27. _____ function returns the largest integer less than or equal to x.
(a) cell () (b) floor ()
(c) pow () (d) round ()
[Ans. (b) floor ()]

CONSIDER THE FOLLOWING STATEMENT

1. **Assertion :** In keyword arguments user can also put arguments in improper order.
Reason : The value of the keyword argument is matched with the parameter name.
(a) A & R is True
(b) A & R is False
(c) A is True R is False
(d) A is false and R is True
[Ans. (d) A & R is True]

CHOOSE THE CORRECT PAIR

1.

a)	User-defined function	that are inbuilt with in python
b)	Built – in functions	defines by the user themselves.
c)	Lambda functions	that are anonymous un-named functions
d)	Recursive function	that calls next function to execute

[Ans. (c) Lambda functions – that are anonymous un-named functions]

2.

	Function	Output
a)	print (math.floor (–23.2))	–24
b)	print (math, ceil (–23.2))	–24
c)	print (ord (97))	a
d)	print (char (A))	65

[Ans. (a) print (math.floor (-23.2)) =-24]

CHOOSE THE INCORRECT PAIR

1.

	Function	Output
a)	print (type (True))	<class 'bool'>
b)	print (bin (5))	101
c)	print (format (5, 'b')	101
d)	print (math.ceil (-23.2)	–23

[Ans. (b) print (bin (5)) - 101]

2.

a)	abs ( )	absolute value
b)	ord ( )	inverse of chr( )
c)	chr ( )	inverse of ord ( )
d)	bin ( )	minimum value

[Ans. (d) bin ( ) - minimum value]

CHOOSE THE CORRECT STATEMENT

1. (i) Lambda function is not used for creating small and one time anonymous function.
(ii) Lambda function is a function defined without a name.
(iii) Lambda function is also called Synchronous function.
(iv) Lambda function must return one value in the form of an expression.
(a) i and iii (b) ii and iii
(c) iii and iv (d) only i
[Ans. (a) i and iii]

2. (i) The return statement causes your function to exit.
(ii) The return statement returns value to its caller
(iii) Any number of return statements are allowed
(iv) Only one return is executed at runtime
(a) i and ii (b) i, iii and iv
(c) ii and iv (d) ii and iii
(e) all of these **[Ans. (e) all of these]**

CHOOSE THE INCORRECT STATEMENT

1. (a) Functions avoids repetion and makes with degree of code using .
(b) Functions does not provide better modularity for python application
(c) Recursive functions are the functions which calls itself
(d) A group of related statement that perform a specific task called functions.
[Ans. (b) Functions does not provide better modularity for python application]

2. (i) Non –keyword variable arguments are called dictionaries
(ii) Variable – length arguments can be defined using *.
(iii) Lambda keyword is used to define anonymous function
(iv) Anonymous function is a function that must be defined with a name.
(a) I and II (b) II and III
(c) I, II and IV (d) I and IV
[Ans. (d) I and IV]

3. (i) A variable defined within a block can be accessed outside a function also.
(ii) Local variable only exits while the function is executing.
(iii) a variable defined outside a function, its global by default.
(iv) local keyword is used to read and write local variable inside a function.
(a) i and ii (b) iii and iv
(c) ii and iii (d) i and iv
[Ans. (d) i and iv]

4. (a) Required arguments are the arguments passed to a function in correct positional order
(b) Keyword arguments will not invoke the function after the parameters are recognized by their parameter names.
(c) A python function allows us to give the default values for parameters in the function definition.
(d) Variable length arguments are not specified in the function's definition.
[Ans. (b) Keyword arguments will not invoke the function after the parameters are recognized by their parameter names.]

Very Short Answers 2 MARKS

1. How the statements in a black are written in python?

Ans. In Python, statements in a block are written with *indentation.*

2. What is meant by block in python?

Ans. A block is *one or more lines of code*, grouped together so that they are treated as one big sequence of statements while execution.

3. How the nested block are indented?

Ans. A block within a block is called nested block. When the first block statement is indented by a single table space, the second block of statement is indented by double tab spaces.

4. Write the output of the following program.

Ans. **Example :**

```
def hello():
    print ("hello - Python")
    return
    print (hello())
```

Output:

```
hello – Python
None
```

5. Differentiate parameters and arguments.

Ans. Parameters are the variables used in the function definition whereas arguments are the values we pass to the function parameters.

6. Write the syntax for passing arguments to functions.

Ans. **syntax :**

def function_name (parameter(s) separated by comma):

7. Write the output for the following program

Ans.

```
def display (a, b):
    return a * * b
print (area (2, 5)
```

Output : 32

8. What are arguments? What are the types?

Ans. Arguments are used to call a function and there are primarily 4 types of functions. They are: Required arguments, Keyword arguments, Default arguments and Variable-length arguments.

9. What are the methods used to parse the arguments to the variable length arguments?

Ans. In Variable Length arguments we can parse the arguments using two methods.

(i) Non keyword variable arguments

(ii) Keyword variable arguments

10. What are called tuples?

Ans. Non-keyword variable arguments are called **tuples**.

11. How the value returned from lambda function?

Ans. Lambda function can take any number of arguments and must return one value in the form of an expression.

12. Write the output for the following program.

Ans.

```
z = lamda x, y:x//y
print (z (10, 3))
```

Output : 3

13. What is local variable?

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

14. Write the output for the following.

(i) Print (ord ('a'))

(ii) Print (chr (65))

(iii) Print (bin (15))

(iv) Print (format (15, 'b'))

Ans.

(i) 97

(ii) A

(iii) ob 1111

(iv) 1111

Short Answers 3 MARKS

1. When do you call the function to perform a specify task?

Ans.

(i) When you want to perform a particular task that you have defined in a function, you call the name of the function responsible for it.

(ii) If you need to perform that task multiple times throughout your program, you don't need to type all the code for the same task again and again.

(iii) You just call the function dedicated to handling that task, and the call tells Python to run the code inside the function.

2. Write the advantages of user – defined functions.

Ans. Advanntages of User-defined Functions

(i) Functions help us to divide a program into modules. This makes the code easier to manage.

(ii) It implements code reuse. Every time you need to execute a sequence of statements, all you need to do is to call the function.

(iii) Functions, allows us to change functionality easily, and different programmers can work on different functions.

3. Write a note on "Required arguments".

Ans. (i) **"Required Arguments"** are the arguments passed to a function in correct positional order. Here, the number of arguments in the function call should match exactly with the function definition.

(ii) Atleast one parameter to prevent syntax errors to get the required output.

(iii) **Example :**

```
def printstring(str):
        print ("Example - Required  arguments")
        print (str)
        return
# Now you can call printstring() function
printstring ("Welcome")
```

Output:

Example - Required arguments
Welcome

4. How will you invoke the function after the parameters are recognized by their parameter names? Explain with an example.

Ans. (i) Keyword arguments will invoke the function after the parameters are recognized by their parameter names.

(ii) The value of the keyword argument is matched with the parameter name and so, one can also put arguments in improper order.

(iii) **Example :**

```
def printdata (name):
        print ("Example-1 Keyword  arguments")
        print ("Name :",name)
        return
# Now you can call printdata() function
printdata(name = "Gshan")
```

When the above code is executed, it produces the following output :

Output:

Example-1 Keyword arguments
Name :Gshan

5. How python takes a default value in the function call? Explain with an example.

Ans. (i) In Python the default argument is an argument that takes a default value if no value is provided in the function call.

(ii) The following example uses default arguments, that prints default salary when no argument is passed.

(iii) **Example :**

```
def printinfo( name, salary = 3500):
        print ("Name: ", name)
        print ("Salary: ", salary)
        return
printinfo("Mani")
```

When the above code is executed, it produces the following output

Output:

Name: Mani
Salary: 3500

When the above code is changed as print info("Ram",2000) it produces the following output:

Output:

Name: Ram
Salary: 2000

6. When the variable – length arguments are used? Explain with an example.

Ans. (i) **Syntax - Variable-Length Arguments :**

```
def function_name(*args):
        function_body
        return_statement
```

(ii) **Example :**

```
def printnos (*nos):
        for n in nos:
        print(n)
        return
# now invoking the printnos() function
print ('Printing two values')
printnos (1,2)
print ('Printing three values')
printnos (10,20,30)
```

Output:

Printing two values
1
2
Printing three values
10
20
30

7. Write a note of return statement.

Ans. **The return Statement :**

(i) The return statement causes your function to exit and returns a value to its caller. The point of functions in general is to take inputs and return something.

(ii) The return statement is used when a function is ready to return a value to its caller. So, only one return statement is executed at run time even though the function contains multiple return statements.

(iii) Any number of 'return' statements are allowed in a function definition but only one of them is executed at run time.

8. What is the use of global keyword? Explain with an example?

Ans. The global keyword are used modify the global variable inside the function.

Changing Global Variable From Inside a Function using global keyword.

```
x = 0                    # global variable
def add():
global x
    x = x + 5            # increment by 2
    print ("Inside add() function x value is :", x)
    add()
    print ("In main x value is :", x)
```

Output :

```
Inside add() function x value is : 5
In main x value is : 5
```

9. Explain with an example how will you use global and local variables in the same code.

Ans. **Using Global and Local variables in same code :**

```
x=8          # x is a global variable
def loc():
    global x
    y = "local"
    x = x * 2
    print(x)
    print(y)
loc()
```

Output :

```
16
local
```

10. Explain how will you use global and local variable with same name.

Ans.

```
x = 5
def loc():
        x = 10
        print ("local x:", x)
loc()
print ("global x:", x)
```

Output :

```
local x: 10
global x: 5
```

11. Write a note on (i) min (), (ii) max (), (iii) sum ().

Ans.

S.No.	Function	Description	Syntax	Example
(i)	min ( )	Returns the minimum value in a list.	min (list)	MyList = [21,76,98,23] print ('Minimum of MyList :', min (MyList)) **Output :** Minimum of MyList : 21
(ii)	max ( )	Returns the maximum value in a list.	max (list)	MyList = [21,76,98,23] print ('Maximum of MyList :', max (MyList)) **Output :** Maximum of MyList : 98
(iii)	sum ( )	Returns the sum of values in a list.	sum (list)	MyList = [21,76,98,23] print ('Sum of MyList :', sum (MyList)) **Output :** Sum of MyList : 218

12. Write a note on (i) floor (), (ii) ceil (), (iii) Sprt ().

Ans.

Function	Description	Syntax	Example
floor ( )	Returns the largest integer less than or equal to x	math.floor (x)	x=26.7 print (math.floor (x)) **Output :** 26
ceil ( )	Returns the smallest integer greater than or equal to x	math.ceil (x)	x= 26.7 print (math.ceil (x)) **Output :** 27
sqrt ( )	Returns the square root of x Note: x must be greater than 0 (zero)	sqrt (x)	b= 49 print (math.sqrt (b)) **Output :** 7.0

Long Answers **5 MARKS**

1. Write a python program to find HCF of two numbers using recursion.

Ans.

```
# python program to find HCF
def HCF (x, y):
    if (x > y):
        s = y
else:
        s = x
for I inrange (1, s + 1):
    if ((x % I = = 0) and (y % i = = 0)):
        hcf = i
        return hcf
x = int (input ("Enter Number 1"))
y = int (input ("Enter Number 2"))
print (HCF (x, y))
```

2. Write a python program to find Fibonacci series of n terms using recursion.

Ans.

```
# program to find fibonacci series
def fibo (n):
    if n < = 1:
    return n
else:
    return (fibo (n - 1) + fibo (n - 2))
n = int (input ("Enter How manu terms"))
for i in range (n):
    print (fibo (i))
```

☆☆☆

CHAPTER 8

STRINGS AND STRING MANIPULATION

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

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

[Ans. (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

[Ans. (c) Type error]

3. Which of the following operator is used for concatenation?

(a) + (b) & (c) * (d) =

[Ans. (a) +]

4. Defining strings within triple quotes allows creating: *[HY-2019]*

(a) Single line Strings (b) Multiline Strings
(c) Double line Strings (d) Multiple Strings

[Ans. (b) Multiline Strings]

5. Strings in python:

(a) Changeable (b) Mutable
(c) Immutable (d) flexible

[Ans. (c) Immutable]

6. Which of the following is the slicing operator? *[PTA-1]*

(a) { } (b) [ ] (c) < > (d) ( )

[Ans. (b) [ ]]

7. What is stride? *[PTA-2]*

(a) index value of slide operation
(b) first argument of slice operation
(c) second argument of slice operation
(d) third argument of slice operation

[Ans. (d) third argument of slice operation]

8. Which of the following formatting character is used to print exponential notation in upper case? *[PTA-5]*

(a) %e (b) %E (c) %g (d) %n

[Ans. (b) %E]

9. Which of the following is used as placeholders or replacement fields which get replaced along with format( ) function? *[PTA-4]*

(a) { } (b) < > (c) ++ (d) ^^

[Ans. (a) { }]

10. The subscript of a string may be:

(a) Positive (b) Negative
(c) Both (a) and (b) (d) Either (a) or (b)

[Ans. (d) Either (a) or (b)]

PART - II

ANSWER THE FOLLOWING QUESTIONS

(2 MARKS)

1. What is String?

Ans. **(i)** String is a data type in python, which is used to handle array of characters.

(ii) 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.

(iii) Example :

'Welcome to learning Python'
"Welcome to learning Python"
" "Welcome to learning Python" "

2. Do you modify a string in Python?

Ans. **(i)** Yes we can modify the string by the following method.

(ii) A new string value can be assign to the existing string variable.

(iii) When defining a new string value to the existing string variable.

(iv) Python completely overwrite new string on the existing string.

3. How will you delete a string in Python?

Ans. Python will not allow deleting a particular character in a string. Whereas you can remove entire string variable using **del** command.

```
>>> str1="How about you"
>>> print (str1)
    How about you
>>> del str1
>>> print (str1)
Traceback (most recent call last):
    File "<pyshell#14>", line 1, in <module>
        print (str1)
```

NameError: name 'str1' is not defined

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

```
str1 = "School"
print(str1*3)
```

Ans. **Output :** School School School

5. What is slicing? *[PTA-6]*

Ans. **(i)** 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.

(ii) 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]

PART - III

ANSWER THE FOLLOWING QUESTIONS

(3 MARKS)

1. Write a Python program to display the given pattern. *[Govt. MQP-2019]*

```
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
```

Ans.

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

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

(a) capitalize( ) (b) swapcase( ) *[PTA-1, 3]*

Ans.

Syntax	Description	Example

(a) capitalize( )	Used to capitalize the first character of the string	>>> city="chennai"
		>>> print(city.capitalize())
		Chennai

(b) swapcase( )	It will change case of every character to its opposite case vice-versa.	>>> str1="tAmiL NaDu"
		>>> print(str1.swapcase())
		TaMIl nAdU

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

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

Ans. weol

4. What is the use of format( )? Give an example. *[HY-2019]*

Ans.

(i) The format( ) function used with strings is very versatile and powerful function used for formatting strings.

(ii) The curly braces { } are used as placeholders or replacement fields which get replaced along with format( ) function.

(iii) 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
```

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

Ans.

Syntax	Description	Example

count (str, beg, end)	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.	>>> str1="Raja Raja Chozhan"
		>>> print(str1.count('Raja'))
		2
		>>> print(str1.count('r'))
		0
		>>> print(str1.count('R'))
		2
		>>> print(str1.count('a'))
		5
		>>> print(str1.count('a',0,5))
		2
		>>> print(str1.count('a',11))
		1

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. Explain about string operators in python with suitable example. *[PTA-2; HY-2019]*

Ans. **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 **[ ] slicing operator** and index values.
- Using slice operator, you have to slice one or more substrings from a main string.

General format of slice operation :

```
str[start:end]
```

- Where **start** is the beginning index and **end** is the last index value of a character in the string.
- Python takes the end value less than one from the actual index specified.

Example :

slice a single character from a string

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

Output :

```
T
```

(v) Stride when slicing string :

- When the slicing operation, you can specify a third argument as the stride, which refers to the number of characters to move forward after the first character is retrieved from the string.
- The default value of stride is 1.
- Python takes the last value as n-1.
- You can also use negative value as stride, to prints data in reverse order.

Example :

```
>>>str1="Welcome to learn Python"
>>>print (str1[10:16])
>>>print (str1[::-2])
```

Output :

```
Learn
nhy re teolW
```

Hands on Experience

1. Write a python program to find the length of a string.

Ans.

```
str = input ("Enter a string")
print (len(str))
```

Output :

```
Enter a string : HELLO
5
```

2. Write a program to count the occurrences of each word in a given string.

Ans.

```
def word_conunt(str):
    counts=dict()
    words=str.split()
     for word in words:
        if word in counts:
            counts[word]+=1
        else:
            counts[word]=1
    return counts
print(word_count('the quick brown fox jumps over the lazy dog.'))
```

Output :

```
{'th' :2, jumps' : 1, 'brown' : 1, 'lazy' : 1, 'fox' : 1, 'over' : 1, 'quick' : 1, 'dog' : 1}
```

3. Write a program to add a prefix text to all the lines in a string.

Ans.

```
import textwrap
text =
    ""Strings are immutable. Slice is a substring
    of a main string. Stride is a third argument
    in slicing operation""
text_without_Indentation = textwrap.
                                dedent(text)
wrapped=textwrap.fill(text_without_
                        Indentation, width=50)
print(textwrap.indent(wrapped, '*')
print ( )
```

Output :

```
* Strings are immutable. Slice is a
* substring of a main string. Stride
* is a third argument in slicing operation
```

4. Write a program to print integers with '*' on the right of specified width.

Ans.

```
x = 1 2 3
print("original number:", x)
print("formatted number(right padding, width 6) : "+" {:*<7d}".format(x));
```

Output :

```
original number : 1 2 3
formatted number(right padding, width 6): 1 2 3 ***
```

5. Write a program to create a mirror of the given string. For example, "wel" = "lew".

Ans.

```
str1= input ("Enter a string")
str2 = ' '
index = -1
for i in str1:
     str2 = str1[index]
     index - = 1
print ("The given string = { } \n The Reversed string = { }".format(str1, str2))
```

Output :

```
Enter a string : welcome
The given string = welcome
The Reversed string = emoclew
```

6. Write a program to removes all the occurrences of a give character in a string.

Ans.

```
def removechar(s,c):
    # find total no of occurrence of a character
    counts = s.count(c)
    # convert into list of characters
    s = list(s)
    # keep looping until counts become 0
    while counts :
    # remove char. from list
        s.remove(c)
        counts – = 1
    # join remaining characters
    s = ".join(s)
    print(s)
    s = "Python programming"
    remove char(s, 'p')
```

Output :

```
ython rogramming
```

7. Write a program to append a string to another string without using += operator.

Ans.
```
s1 = input ("Enter first string :")
s2 = input ("Enter second string :")
print('concatenated strings =', " ".join([s1,s2]))
```
Output :
```
Enter the first string : Tamil
Enter the second string : Nadu
concatenated strings = Tamil Nadu
```

8. Write a program to swap two strings.

Ans.
```
print("Enter 'x' for exit.")
string1 = input("Enter first string :")
if string1 = = 'x':
    exit();
else:
    string2=input("Enter second string :")
    print("\n Both strings before swap : ")
    print("First string =", string1)
    print ("Second string = ", string2)
    temp = string1
    string1 = string2
    string2 = temp
    print("\n Both strings after swap :")
    print("First string =", string1)
    print("Second string =", string2)
```
Output :
```
Enter 'x' for exit
Enter first string : code
Enter second string : python
Both strings before swap:
First string = code
Second string = python
Both strings after swap:
First string = python
Second string = code
```

9. Write a program to replace a string with another string without using replace().

Ans.
```
s1 = input ("Enter the string to be replaced :")
s2 = input ("Enter string to replace with")
s1 = s2
print("Replaced strings is :, sl)
```
Output :
```
Enter the string to be replaced : Computer
Enter the string to replace with : repcomputer
Replaced string is repcomputer
```

10. Write a program to count the number of characters, words and lines in a given string.

Ans.
```
string = input ("Enter string :")
char = 0
word = 0
line = 0
for i in string :
    char = char + 1
    if(i = = ' ') :
        word = word + 1
    elifi(i = ='\n'):
        line = line + 1
print ("Number of words in the string :"))
print (word)
print ("Number of characters in the string :")
print(char)
print("Number of lines in the string :")
print(line)
```
Output :
```
Enter string : weclome to learning python
Number of words in the string : 4
Number of characters in the string : 26
Number of lines in the string : 1
```

PTA Questions and Answers

1 MARK

1. Which command can be used to remove entire string variable in Python? *[PTA-3]*

(a) rem (b) remove
(c) del (d) delete

[Ans. (c) del]

2. What will be the output of the following snippet? *[PTA-6]*
```
str1="COMPUTER"
print(str1[::2])
```
(a) ER (b) CO
(c) OPTR (d) CMUE

[Ans. (c) OPTR]

2 MARKS

1. What will be the output of the following Python code? *[PTA-1]*
```
Str1 = "Madurai"
print(Str1*3)
```
Ans. **Output :**
Madurai Madurai Madurai

2. What are membership operators in Python?

Ans. **Membership Operators :** *[PTA-2]*

(i) The 'in' and 'not in' operators can be used with strings to determine whether a string is present in another string. Therefore, these operators are called as Membership Operators.

(ii) **Example :**

```
str1=input ("Enter a string: ")
str2="chennai"
if str2 in str1:
        print ("Found")
else:
        print ("Not Found")
```

(iii) **Output : 1**

Enter a string: Chennai GHSS, Saidapet
Found

(iv) **Output : 2**

Enter a string: Govt GHSS, Ashok Nagar
Not Found

3. What will be the output of the following Python snippet? *[PTA-4]*

```
str1="THOLKAPPIYAM"
print(str1([4:])
print(str1[4::2])
print(str1[::3])
print(str1[::–3])
```

Ans. **Output :**

THOLKAPPIYAM

4. What is the positive and negative subscript value of the character 'h' in string 'school'? *[PTA-5]*

Ans. Positive value = 2

Negative value = –4

3 MARKS

1. What is the use of the operator += in Python string operation?

(or)

Write a short note on string slicing with syntax and example. *[Govt. MQP-2019; PTA-3]*

Ans. 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]

Where start is the beginning index and end is the last index value of a character in the string. Python takes the end value less than one from the actual index specified. For example, if you want to slice first 4 characters from a string, you have to specify it as 0 to 5. Because, python consider only the end value as n-1.

Example : slice a single character from a string

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

2. What will be the output of the following Python program? *[PTA-4]*

```
str1 = "welcome"
str2 = "to school"
str3 = str1[:3]+str2[len(str2)-1:]
print(str3)
```

Ans. **Output :**

weol

3. How index value allocated to each character of a string in Python? *[PTA-5]*

Ans. (i) Once you define a string, python allocate an index value for its each character. These index values are otherwise called as subscript which are used to access and manipulate the strings. The subscript can be positive or negative integer numbers.

(ii) The positive subscript 0 is assigned to the first character and n-1 to the last character, where n is the number of characters in the string. The negative index assigned from the last character to the first character in reverse order begins with -1.

Example :

String	S	C	H	O	O	L
Positive subscript	0	1	2	3	4	5
Negative subscript	–6	–5	–4	–3	–2	–1

4. Write a note on string formatting operators of Python. *[PTA-6]*

Ans. The string formatting operator is one of the most exciting feature of python. The formatting operator % is used to construct strings, replacing parts of the strings with the datastored in variables.

Syntax:

("String to be display with %val1 and %val2" %(val1, val2))

Example :

```
name = "Rajarajan"
mark = 98
print("Name: %s and Marks: %d" %(name,mark))
```

Output :

Name: Rajarajan and Marks: 98

5. Explain about slicing and slicing with stride. *[PTA-6]*

Ans. **(i)** 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.

(ii) 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]

When the slicing operation, you can specify a third argument as the stride, which refers to the number of characters to move forward after the first character is retrieved from the string. The default value of stride is 1.

5 MARKS

1. Write the short note on the following built-in string functions. *[PTA-3]*

(i) capitalize() **(ii) isalpha()**

(iii) isalnum() **(iv) lower()**

Ans.

Syntax	Description	Example

capitalize( )	Used to capitalize the first character of the string	>>> city="chennai"
		>>> print(city. capitalize())
		Chennai

isalpha( )	Returns True if the string contains only letters. Otherwise return False.	>>>'Click123'.isalpha() False >>>'python'.isalpha() True
isalnum( )	Returns True if the string contains only letters and digit. It returns False. If the string contains any special character like _, @,#, *, etc.	>>>str1='Save Earth' >>>str1.isalnum() False The function returns False as space is an alphanumeric character. >>>'Save1Earth'.isalnum() True
lower( )	Returns the exact copy of the string with all the letters in lowercase.	>>>str1='SAVE EARTH' >>>print(str1.lower()) save earth

2. **Explain the following string functions with suitable examples.** *[Govt. MQP-2019; PTA- 4 , 5]*

(i) center() **(ii) find()**

Ans.

Syntax	Description	Example

center(width, fillchar)	Returns a string with the original string centered to a total of width columns and filled with fillchar in columns that do not have characters	>>> str1="Welcome"
		>>> print(str1.center(15,'*'))
		****Welcome****

find(sub[, start[, end]])	The function is used to search the first occurrence of the sub string in the given string. It returns the index at which the substring starts. It returns -1 if the substring does not occur in the string.	>>>str1='mammals' >>>str1.find('ma') 0 On omitting the start parameters, the function starts the search from the beginning. >>>str1.find('ma',2) 3 >>>str1.find('ma',2,4) -1 Displays -1 because the substring could not be found between the index 2 and 4-1. >>>str1.find('ma',2,5)

Government Exam Questions and Answers

1 MARK

1. **The positive and negative index values of 'P' in the string Str1='COMPUTER' are** *[Govt. MQP-2019]*

(a) 3, –4 (b) 4, –4

(c) 3, –5 (d) 4, –5

[Ans. (c) 3, –5]

2 MARKS

1. **What will be the output of the following Python Code?** *[HY-2019]*

```
str="Chennai"
print(str*4)
```

Ans. **Output :** Chennai Chennai Chennai Chennai

2. **Explain the following function.** *[QY-2019]*

Ans.

Syntax	Description	Example
lower( )	Returns the exact copy of the string with all the letters in lowercase.	>>>str1='SAVE EARTH' >>>print(str1.lower()) *save earth*

3 MARKS

1. **Write the output for the following program** *[QY-2019]*

```
str="COMPUTER"
index=0
for i in str:
    print(str[: index+1])
    index +=1
```

Ans. **Output :**

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

5 MARKS

1. **Write a python program to check whether the given string is palindrome or not.** *[QY-2019]*

Ans.

```
str1 = input ("Enter a string: ")
str2 = ' '
index=-1
```

```
for i in str1:
    str2 += str1[index]
    index -= 1
print ("The given string = { } \n The Reversed
                    string = { }".format(str1, str2))
if (str1==str2):
    print ("Hence, the given string is
                                Palindrome")
else:
    print ("Hence, the given is not a
                                palindrome")
```

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER — 1 MARK

1. Which of the following is used to handle array of characters in python?
(a) Functions (b) Composition
(c) String (d) Arguments
[Ans. (c) String]

2. String are enclosed with
(a) " (b) " "
(c) """ """ (d) ''' '''
(e) all of these **[Ans. (e) all of these]**

3. Which of the following allows creation of multiline strings
(a) ' ' (b) " "
(c) """ """ (d) none of these
(e) None of these **[Ans. (c) """ """]**

4. Find the output for the following
print ('Greater Chennai cooperation's student')
(a) Greater Chennai Corporation's student
(b) Greater Chennai Corporation
(c) S Student
(d) Error : Invalid Syntax
[Ans. (d) Error : Invalid Syntax]

5. String index values are also called as
(a) class (b) function
(c) subscript (d) arguments
[Ans. (c) subscript]

6. Which of the following is used to access and manipulate the strings?
(a) Index value (b) Subscript
(c) Argument (d) Parameters
(e) a or b **[Ans. (e) a or b]**

7. The positive subscript always starts with
(a) 0 (b) 1 (c) –1 (d) 0.1
[Ans. (a) 0]

8. The negative subscript is always begins with
(a) 0 (b) 1
(c) –1 (d) –1.0
[Ans. (c) –1]

9. What is the output for the following
>>> s1 = "how"
>>>s1[0] = 'A'
(a) How (b) A
(c) Aow (d) Error
[Ans. (d) Error]

10. Which of the following operators are useful to do string manipulation?
(a) +, - (b)*, / (c) + * (d)', "
[Ans. (c) + *]

11. Adding more strings at the end of an existing string is known as
(a) Con cat (b) Con catenation
(c) Join (d) Append
[Ans. (d) Append]

12. A substring can be taken from the original string by using
(a) { } (b) ( ) (c) [ ] (d) < >
[Ans. (c) [ ]]

13. What is the output from the following statement?
```
str1 = "welcome"
print (str1[: : 3]
```
(a) come (b) ome
(c) wce (d) wel
[Ans. (c) wce]

14. What is the output from the following statement?
```
str1 = "python"
print (str1 [: : - 2])
```
(a) nhy (b) Pyt (c) hy (d) on
[Ans. (a) nhy]

15. Which of the following operator is used to construct strings?
(a) : (b) % (c) : : (d) #
[Ans. (b) %]

16. Which of the following formatting operator is used to represent signed decimal integer?
(a) % d or % i (b) %s or % c
(c) %g or % x (d) %s or % e
[Ans. (a) % d or % i]

17. Escape sequences starts with a
(a) / (b) \ (c) // (d) \"
[Ans. (b) \]

18. What is Escape sequence character for the description character with octal value?
(a) \OHH (b) \OOO
(c) /OOO (d) /OHH
[Ans. (b) \OOO]

19. Which of the following is used as a place holders which get replaced along with format function?
(a) [ ] (b) ( ) (c) { } (d) < >
[Ans. (c) { }]

20. The function returns the length of the string in python is
(a) length ( ) (b) leng ( )
(c) len ( ) (d) strlrn ( )
[Ans. (c) len ( )]

21. What will be the output of print (len("CHENNAI"))?
(a) 7 (b) 8
(c) 9 (d) Error **[Ans. (a) 7]**

22. Which of the following function used to capitalize the first character of the string?
(a) captial ( ) (b) firstcapital ( )
(c) capitalize ( ) (d) capitalizefirst ( )
[Ans. (c) capitalize ( )]

23. The function used to search the first occurrence of the substring in the given string is
(a) search ( ) (b) find ( )
(c) find string ( ) (d) searchstring ( )
[Ans. (b) find ( )]

24. What is the output for the following?
'mammals'. find ('ma')
(a) 0 (b) 1 (c) –1 (d) 3
[Ans. (a) 0]

25. What is the output for the following?
'mammals'. find ('ma', 2)
(a) 0 (b) 1 (c) –1 (d) 3
[Ans. (d) 3]

26. What is the output for the following?
'mammals'. find ('ma',2,4)
(a) 0 (b) 1 (c) –1 (d) 3
[Ans. (c) –1]

27. What is the output for the following?
'mammals'. find ('ma',2,5)
(a) 0 (b) 3 (c) –1 (d) 1
[Ans. (b) 3]

28. Which function returns the number of substrings occurs within the given range?
(a) return () (b) count ()
(c) substring () (d) range ()
[Ans. (b) count ()]

29. The default value of stride is
(a) 0 (b) – 1 (c) 1 (d) – 0
[Ans. (c) 1]

MATCH THE FOLLOWING

1.

(i)	% i	(1)	short number in exponential form
(ii)	% 0	(2)	exponential notation
(iii)	% G	(3)	signed decimal integer
(iv)	% X	(4)	octal integer
(v)	% E	(5)	hexadecimal integer

(a) 3, 4, 5, 1, 2 (b) 3, 4, 1, 2, 5
(c) 3, 1, 4, 5 2 (d) 3, 4, 1, 5, 2
[Ans. (d) 3, 4, 1, 5, 2]

2.

(i)	\a	(1)	line feed
(ii)	\b	(2)	Backspace
(iii)	\f	(3)	Horizontal Tab
(iv)	\n	(4)	Bell
(v)	\t	(5)	Form feed

(a) 2, 4, 5, 1, 3 (b) 4, 2, 5, 3, 1
(c) 4, 2, 5, 3, 1 (d) 4, 5, 2, 1, 3
[Ans. (c) 4, 2, 5, 3, 1]

CHOOSE AND FILL IN THE BLANKS

1. _____ is a combination of letters, numbers or special symbols enclosed with. ", " " or "' "'
(a) String (b) Function
(c) Parameters (d) Scope fo aviable
[Ans. (a) String]

2. In python _____ are immutable.
(a) Characters (b) Strings
(c) Numbers (d) Functions
[Ans. (b) Strings]

3. When a string is define(d) Python allocate an _____ for its each character.
(a) Function (b) Arguments value
(c) Index value (d) Parameter
[Ans. (c) Index value]

4. The subscript can be _____ integer numbers.
(a) Positive (b) Negative
(c) Floating
(d) Positive or negative
[Ans. (d) Positive or negative]

5. Python provides a function _____ to change all occurrences of a particular character in a string.
(a) replace( ) (b) change ( )
(c) change all ( ) (d) repalceall ()
[Ans. (a) replace( )]

6. In Python, the entire string variable removed using _____ command
(a) Remove (b) Replace
(c) Del (d) Delete
[Ans. (c) Del]

7. The _____ operator is used to append a new string with an excisting string.
(a) + (b) + = (c) * = (d) * *
[Ans. (b) + =]

8. The _____ operator is used to display a string in multiple number of time.
(a) * (b)* * (c) + = (d) + +
[Ans. (a) *]

9. _____ is a substring of a mainstring.
(a) stride (b) slice
(c) concat (d) append
[Ans. (b) slice]

10. Write the missing symbol in the following statement.
str [start —— end]
(a) ; (b) , (c) : : (d) :
[Ans. (d) :]

11. The formatting operator _____ is used to replacing parts of strings with the data stored in variables.
(a) # (b) : (c) % (d) : :
[Ans. (c) %]

12. The _____ function is a powerful function used for formatting strings.
(a) format ( ) (b) string ( )
(c) Slice ( ) (d) format string( )
[Ans. (a) format ( )]

13. The 'in' and 'not in ' operators are called as _____ operators.
(a) string (b) string formatting
(c) membership (d) reference
[Ans. (c) membership]

CHOOSE CORRECT PAIR

1. (a) % d – unsigned decimal integer.
(b) % 0 – short number in floating point
(c) % i – signed decimal integer
(d) % x – octal integer.
[Ans. (c) % i – Signed decimal integer]

2. (a) \a – Aarriage Return (b)\b – Backspace
(c) \v – Value ooo (d) \f – Formfeed
[Ans. (b) \b – Backspace]

CHOOSE INCORRECT PAIR

1. (a) % u – unsigned decimal integer
(b) % d – signed decimal integer
(c) % e – exponential notation
(d) % G – short numbers in exponential notation
[Ans. (b) % d – signed decimal integer]

2. (a) \n – line feed
(b) \f – Form feed
(c) \b – Backspace
(d) \h – Horizontal tab
[Ans. (d) \h – Horizontal tab]

3.

(a)	'EARTH'. Lower ()	earth
(b)	'Save earth'. Title()	Save Earth
(c)	'Save earth '. Capitalize ()	Save earth
(d)	'Earth '. Snap case ()	eARTH

[Ans. (c) 'Save earth '. Capitalize () – Save earth]

CHOOSE THE INCORRECT STATEMENT

1. (i) String is not a data type in python
(ii) Strings are enclosed with single, double or triple quotes.
(iii) Strings are not immutable.
(iv) Strings cannot be changed during execution.
(a) i and ii (b) i, iii and iv
(c) only iii (d) i and iii
[Ans. (d) i and iii]

2. (i) In Python, string are immutable.
(ii) Python allow to modify the already defined string.
(iii) Python will not allow deleting a particular character in string.
(iv) In Python, the index value is only a positive integer.
(a) i and iii (b) ii and iv
(c) i, ii and iv (d) ii and iii

[Ans. (b) ii and iv]

VERY SHORT ANSWERS 2 MARKS

1. How will you manipulate the strings?

Ans. **(i)** Once you define a string, python allocate an index value for its each character.
(ii) These index values are otherwise called as subscript which are used to access and manipulate the strings. The subscript can be positive or negative integer numbers.

2. What it means "String in phython are immutable"?

Ans. Strings in python are immutable. That means, once you define a string modifications or deletion is not allowed.

3. Write a python a program to print your name 10 times.

Ans.
```
strl = input ("Enter your name")
print (strl * 10)
```

4. Write the output for the following if strl = "THIRIKKURAL"
(i) print (strl [0])
(ii) print (strl [0:5])
(iii) print (strl [:5])
(iv) Print (strl [6:])

Ans. **(i)** T
(ii) THIRU
(iii) THIRU
(iv) KURAL

5. Write the general format of slice operation.

Ans. **General format of slice operation:**
str[start:end]
Where **start** is the beginning index and **end** is the last index value of a character in the string. Python takes the end value less than one from the actual index specified.

6. What has to be filled in the blank to get the following output
(i) Welcome python
(ii) Welcome to learn python
From
(a) print ("Welcome" ____ "Python")
strl = "Welcome"
(b) print (Strl ____ "to learn python")

Ans. **(a)** +
(b) + =

7. if strl = "Welcome to learn python", then write the output for the following.
(i) print (strl [10 : 16])
(ii) print (strl [10 : 16 : 4])
(iii) print (strl [10 : 16 : 2])
(iv) print (strl [: : 3])

Ans. **(i)** Learn
(ii) r
(iii) er
(iv) ceoenyo

8. What is the use of formatting operator?

Ans. The formatting operator % is used to construct strings, replacing parts of the strings with the data stored in variables.

9. Write the output for the following statement.
(i) print ("save earth" . title ())
(ii) print ("Save Earth" . swapcase ())

Ans. **(i)** Save Earth
(ii) sAVE eARTH

10. Differentiate upper () and is upper ().

Ans.

Syntax	Description	Example
isupper( )	Returns True if the string is in uppercase.	>>> str1='welcome' >>>print (str1.isupper()) *False*
upper( )	Returns the exact copy of the string with all letters in uppercase.	>>> str1='welcome' >>>print (str.upper( )) *WELCOME*

11. What is the use of title () function? Give example.

Ans.

Syntax	Description	Example

title( )	Returns a string in title case	>>> str1='education department'
		>>> print(str1.title())
		Education Department

SHORT ANSWERS 3 MARKS

1. How the positive and negative subscript values are assigned? Give example.

Ans. The positive subscript 0 is assigned to the first character and n-1 to the last character, where n is the number of characters in the string. The negative index assigned from the last character to the first character in reverse order begins with -1.

Example :

String	S	C	H	O	O	L
Positive subscript	0	1	2	3	4	5
Built in functions	–6	–5	–4	–3	–2	–1

2. Write the usage of the following format string characters.

(i) % c
(ii) % d (or) % i
(iii) % s

Ans. (i) character
(ii) Signed decimal integer
(iii) String

3. Fill in the blanks

	Format character	Usage
i)	_____	Unsigned decimal integer
ii)	% 0	_____
iii)	_____	Hexadecimal integer
iv)	% i	_____

Ans. (i) % u
(ii) octal integer
(iii) % c or %x
(iv) signed decimal integer.

4. Write the formats string characters for the following

(i) Exponential notation
(ii) Floating point numbers
(iii) Short numbers in exponential notation

Ans. (i) % e or % E
(ii) % f
(iii) % g or % G

5. Write the description for the following escape sequence.

(i) \r
(ii) \000
(iii) \v

Ans. (i) carriage return
(ii) character with octal value
(iii) vertical tab

6. Write the output of the following statements.

(i) print (len ("Corporation"))
(ii) print ("school", Capitalize ())
(iii) print ("Welcome" center (15, '*'))

Ans. (i) 11
(ii) School
(iii) * * * * Welcome * * * *

7. Write the output of the following statements.

strl = 'mammals'

(i) strl. find ('ma')
(ii) strl. find ('ma', 2)
(iii) strl. find ('ma', 2, 4)
(iv) strl. find ('ma', 2, 5)

Ans. (i) 0
(ii) 3
(iii) - 1
(iv) 3

8. **Write the output of the following statements.**

(i) 'Python 2. 3' . isalpha ()

(ii) 'Python Program' . is alnum ()

(iii) 'Python' . isupper ()

Ans. **(i)** False

(ii) False

(iii) False

9. **Write the output for the following statement.**

(i) print ("PYTHON" . lower ())

(ii) print ("PYTHON" . islower ())

(iii) print ("PYTHON" . isupper ())

(iv) print ("PYTHON" . upper ())

Ans. **(i)** python

(ii) false

(iii) false

(iv) PYTHON

10. **Write a note on**

(i) isalnum () **(ii) isalpha ()** **(iii) isdigit ()**

Ans.

	Syntax	Description	Example
(i)	isalnum ( )	Returns True if the string contains only letters and digit. It returns False. If the string contains any special character like _, @, #, *, etc.	>>>str1='Save Earth' >>>str1.isalnum() ***False*** The function returns False as space is an alphanumeric character. >>>'Save1Earth'.isalnum() ***True***
(ii)	isalpha( )	Returns True if the string contains only letters. Otherwise return False.	>>>'Click123'.isalpha() False >>>'python'.isalpha( ) ***True***
(iii)	isdigit( )	Returns True if the string contains only numbers. Otherwise it returns False.	>>> str1='Save Earth' >>>print(str1.isdigit( )) ***False***

11. **Write the out put for the following statement.**

strl = "Raja Raja Chozhan"

(i) print (strl . count ('Raja'))

(ii) print (strl . count ('R'))

(iii) print (strl . count ('A'))

(iv) print (strl . count ('a'))

(v) print (strl . count ('a', 0, 5))

(vi) print (strl . count ('a', 11))

Ans. **(i)** 2 **(ii)** 2

(iii) 0 **(iv)** 5

(v) 2 **(vi)** 1

Long Answers 5 MARKS

1. Write a python program to print the following pattern

```
*
* *
* * *
* * * *
* * * * *
```

Ans.

```
str1=' * '
i=1
while i<=5:
    print (str1*i)
    i+=1
```

2. Write a python program to display the number of vowels and consonants in the given string.

Ans.

```
str1=input ("Enter a string: ")
str2="aAeEiIoOuU"
v,c=0,0
for i in str1:
    if i in str2:
        v+=1
    else:
        c+=1
print ("The given string contains { } vowels and
        { } consonants".format(v,c))
```

3. Write a python program to create an Abecedarian series, (Abecedarian refers list of elements appear in alphabetical order).

Ans.

```
str1="ABCDEFGH"
str2="ate"
for i in str1:
    print ((i+str2),end='\t')
```

Output :

Aate Bate Cate Date Eate Fate Gate Hate

4. Write a python program that accept a string from the user and display the same after removing vowels from it.

Ans.

```
def rem_vowels(s):
    temp_str=''
    for i in s:
        if i in "aAeEiIoOuU":
            pass
        else:
            temp_str+=i
    print ("The string without vowels: ", temp_ str)
str1= input ("Enter a String: ")
rem_vowels (str1)
```

5. Write a python program that searches and counts the occurrences of a character in string.

Ans.

```
def count(s, c):
    c1=0
    for i in s:
        if i == c:
            c1+=1
    return c1
str1=input ("Enter a String: ")
ch=input ("Enter a character to be searched: ")
cnt=count (str1, ch)
print ("The given character {} is occurs {} times
        in the given string".format(ch,cnt))
```

Output:

Enter a String: Software Engineering
Enter a character to be searched: e
The given character e is occurs 3 times in the given string

6. Write the program to display the following pattern

```
* * * * *
* * * *
* * *
* *
*
```

Ans.

```
strl = '*'
i = 5
while (i > = 1)
    print (strl * i)
    i = 1
```

☆☆☆

UNIT-III MODULARITY AND OOPS

CHAPTER 9

LISTS, TUPLES, SETS AND DICTIONARY

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. Pick odd one in connection with collection data type

(a) List (b) Tuple
(c) Dictionary (d) Loop

[Ans. (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

[Ans. (b) 8]

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()

[Ans. (c) len()]

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]

[Ans. (c) [10,20,35,40,50]]

5. If List=[17,23,41,10] then List.append(32) will result *[PTA-1]*

(a) [32,17,23,41,10] (b) [17,23,41,10,32]
(c) [10,17,23,32,41] (d) [41,32,23,17,10]

[Ans. (b) [17,23,41,10,32]]

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()

[Ans. (c) extend()]

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]

[Ans. (b) [0,1,4,9,16]]

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.

[Ans. (c) To know the data type of python object]

9. Which of the following statement is not correct? *[HY-2019]*

(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

[Ans. (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? *[PTA-2]*

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

(a) {3,6,9,1,3,9} (b) {3,9}
(c) {1} (d) {1,3,6,9}

[Ans. (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? *[Govt. MQP-2019]*

(a) Symmetric difference (b) Difference
(c) Intersection (d) Union

[Ans. (a) Symmetric difference]

12. The keys in Python, dictionary is specified by

(a) = (b) ; (c) + (d) :

[Ans. (d) :]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. What is List in Python?

Ans. **(i)** A list in Python is known as a "sequence data type" like strings. It is an ordered collection of values enclosed within square brackets [].

(ii) Each value of a list is called as element. It can be of any type such as numbers, characters, strings and even the nested lists as well.

2. How will you access the list elements in reverse order? *[QY-2019; HY-2019]*

Ans. Python enables reverse or negative indexing for the list elements. Thus, python lists index in opposite order. The python sets -1 as the index value for the last element in list and -2 for the preceding element and so on. This is called as **Reverse Indexing**.

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

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

Ans. x = 4.

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

Ans.

	del function	remove ( ) function
(i)	del statement is used to delete known elements	remove( ) function is used to delete elements of a list if its index is unknown.
(ii)	The del statement can also be used to delete entire list.	The remove () function can be used to delete one or more elements if the index value is not known.

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

Ans. **Syntax:**

```
Tuple_Name = (E1, E2, E2 ..... En) #Tuple with n number elements
Tuple_Name = E1, E2, E3 ..... En # Elements of a tuple without parenthesis
```

6. What is Set in Python? ***[PTA-4; QY-2019]***

Ans. (i) In Python, a Set is another type of collection data type. A Set is a mutable and an unordered collection of elements without duplicates.

(ii) That means the elements within a set cannot be repeated. This feature used to include membership testing and eliminating duplicate elements.

PART - III

ANSWER THE FOLLOWING QUESTIONS

(3 MARKS)

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

Ans. (i) 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.

(ii) The elements of a list are enclosed within square brackets. But, the elements of a tuple are enclosed by parenthesis.

(iii) Iterating tuples is faster than list.

2. Write a short note about sort( ).

Ans. **Sort ( ) :**

(i) It sorts the element in list.

(ii) sort ( ) will affect the original list.

Syntax :

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

Sorts the element in list :

Both arguments are optional

(i) If reverse is set as True, list sorting is in descending order.

(ii) Ascending is default.

(iii) Key=myFunc; "myFunc" - the name of the user defined function that specifies the sorting criteria.

(iv) sort( ) will affect the original list.

Example :

```
MyList=['Thilothamma', 'Tharani', 'Anitha', 'SaiSree', 'Lavanya']
MyList.sort( )
print(MyList)
```

Output:

```
['Anitha', 'Lavanya', 'SaiSree', 'Tharani', 'Thilothamma']
```

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

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

Ans. **Output :** [1, 2, 4, 8, 16]

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

Ans.

	del	clear( )
(i)	The **del** statements is used to delete known elements	The fuction **clear ( )** is used to delete all the elements in list
(ii)	The del statement can also be used to delete entire list.	It deletes only the elements and retains the list.

5. List out the set operations supported by python.

Ans. **Set Operations :**

(i) **Union :** It includes all elements from two or more sets.

(ii) **Intersection :** It includes the common elements in two sets.

(iii) **Difference :** It includes all elelments that are in first set (say set A) but not in the second set (say set B).

(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.

6. What are the difference between List and Dictionary? *[PTA-3; HY-2019]*

Ans.

	List	Dictionary
(i)	A list is an ordered collection of values or elements of any type.	A dictionary is a mixed collection of elements and it stores a key along with its element.
(ii)	It is enclosed within square brackets [ ]	The key value pairs are enclosed with curly braces { }
(iii)	**Syntax :** Variable = [element-1, element-2, element-3 ..... element-n]	**Syntax or defining a dictionary :** Dictionary_Name = {Key_1: Value_1, Key_2:Value_2, ... Key_n: Value_n }
(iv)	The commas work as a separator for the elements.	The keys in a Python dictionary is separated by a colon (:) while the commas work as a separator for the elements.

PART - IV

ANSWER THE FOLLOWING QUESTIONS

(5 MARKS)

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

Ans. **Inserting elements in a list using insert():**

(i) The insert ( ) function helps you to include an element at your desired position.

(ii) 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,'Kannan',
    'Gowrisankar', 'Lenin', 'Sreenivasan' ]
>>> MyList.insert(3, 'Ramakrishnan')
>>> print(MyList)
```

Output : [34, 98, 47, 'Ramakrishnan', 'Kannan', 'Gowrisankar', 'Lenin', 'Sreenivasan']

(i) In the above example, insert( ) function inserts a new element 'Ramakrishnan' at the index value 3, ie. at the 4th position.

(ii) While inserting a new element, the existing elements shifts one position to the right.

Adding more elements in a list using append():

(i) The append( ) function is used to add a single element in a list.

(ii) But, it includes elements at the end of a list.

Syntax :

List.append (element to be added)

Example :

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

Output : [34, 45, 48, 90]

Adding more elements in a list using extend():

(i) The extend( ) function is used to add more than one element to an existing list.

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

Syntax : List.extend ([elements to be added])

Example :

```
>>> Mylist=[34, 45, 48]
>>> Mylist.extend([71, 32, 29])
>>> print(Mylist)
```

Output : [34, 45, 48, 90, 71, 32, 29]

2. What is the purpose of range( )? Explain with an example. *[HY-2019]*

Ans. 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. The range( ) function has three arguments.

Syntax of range ( ) function:

range (start value, end value, step value)

where,

(i) **start value** – beginning value of series. Zero is the default beginning value.

(ii) **end value** – upper limit of series. Python takes the ending value as upper limit – 1.

(iii) **step value** – It is an optional argument, which is used to generate different interval of values.

Example: Generating whole numbers upto 10

```
for x in range (1, 11):
    print(x)
```

Output :

```
1
2
3
4
5
6
7
8
9
10
```

Creating a list with series of values :

(i) Using the range( ) function, a list can be created with series of values. To convert the result of range( ) function into list, one more function called list is needed( ). The list( ). function makes the result of range( ) as a list.

(ii) **Syntax:** *List_Varibale = list (range ( ))*

(iii) **Example :**

```
>>> Even_List = list(range(2,11,2))
>>> print(Even_List)
```

Output : [2, 4, 6, 8, 10]

(iv) In the above code, list( ) function takes the result of range( ) as Even_List elements. Thus, Even_List list has the elements of first five even numbers.

Similarly, we can create any series of values using range( ) function. The following example explains how to create a list with squares of first 10 natural numbers.

Example : Generating squares of first 10 natural numbers

```
squares = [ ]
for x in range(1,11):
        s = x ** 2
        squares.append(s)
print (squares)
```

Output : [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]

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

Ans. **Nested Tuples :**

(i) 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.

(ii) **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)
```

(iii) **Output :**

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

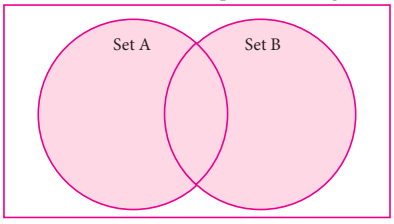
4. Explain the different set operations supported by python with suitable example.

[PTA-1; QY-2019]

Ans. A set is a mutable and an unordered collection of elements without duplicates.

Set operations: The set operation such as Union, Intersection, difference and symmetric difference.

Union: It includes all elements from two or more sets ***[Govt. MQP-2019; PTA-2]***



(i) In python, the operator | is used to union of two sets. The function union( ) is also used to join two sets in python.

(ii) **Example :** Program to Join (Union) two sets using union operator

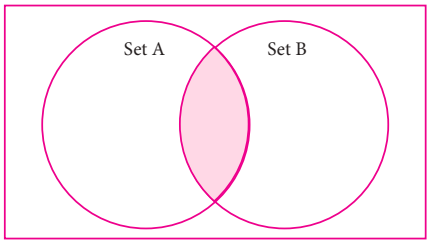
```
set_A={2,4,6,8}
set_B={'A', 'B', 'C', 'D'}
U_set=set_A|set_B
print(U_set)
```

Output :

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

Intersection : *[Govt. MQP-2019; PTA-2]*

(i) It includes the common elements in two sets



(ii) The operator & is used to intersect two sets in python. The function intersection( ) is also used to intersect two sets in python.

(iii) **Example :** Program to insect two sets using intersection operator

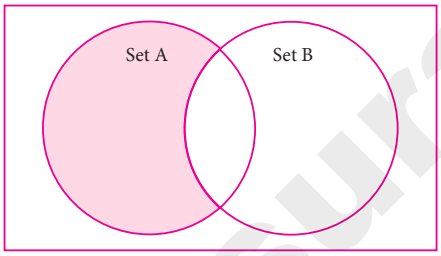
```
set_A={'A', 2, 4, 'D'}
set_B={'A', 'B', 'C', 'D'}
print(set_A & set_B)
```

Output :

{'A', 'D'}

Difference :

(i) It includes all elements that are in first set (say set A) but not in the second set (say set B)



(ii) The minus (–) operator is used to difference set operation in python. The function difference( ) is also used to difference operation.

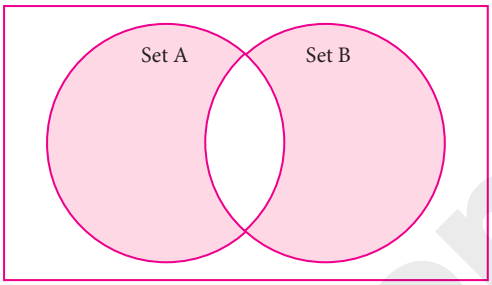
(iii) **Example :** Program to difference of two sets using minus operator

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

Output : {2, 4}

Symmetric difference :

(i) 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.



(ii) The caret (^) operator is used to symmetric difference set operation in python. The function **symmetric_difference( )** is also used to do the same operation.

(iii) **Example :** Program to symmetric difference of two sets using caret operator

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

Output :

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

Hands on Experience

1. Write a program to remove duplicates from a list.

Ans. **Method I :**

```
mylist = [2,4,6,8,8,4,10]
myset = set(mylist)
print(mylist)
```

Output : {2, 4, 6, 8, 10}

Method II :

```
def remove(duplicate):
    final_list=[]
for num in duplicate:
    if num not in final_list:
        final_list.append(mum)
    return final_list
duplicate = [2, 4, 10, 20, 5, 2, 20, 4]
print(remove(duplicate))
```

Output : [2, 4, 10, 20, 5]

2. Write a program that prints the maximum value in a Tuple.

Ans.

```
tuple = (456, 700, 200)
print ("max value : ", max (tuple ))
```

Output : max value : 700

3. Write a program that finds the sum of all the numbers in a Tuples using while loop.

Ans.
```
tuple = (1, 5, 12)
s = 0
i = 0
while(i < len (tuple):
        s = s + tuple [i]
i + = 1
print ("Sum of elements in tuple is ", s)
```
Output : Sum of elements in tuple is 18.

4. Write a program that finds sum of all even numbers in a list.

Ans.
```
numlist = []
even_sum = 0
number = int(input("Please enter the total no. of
                                    list elements"))
for i in range(1, number + 1)
        value = int(input("Please enter the value"))
numlist.append(value)
for j in range(number):
        if(numlist[j] %2 ==0):
                even_sum = even_sum + numlist[j]
print ("Sum of even no. in this list = ", even_sum)
```
Output :
```
Please enter the total no of list elements : 5
Please enter the value : 10
Please enter the value : 11
Please enter the value : 12
Please enter the value : 13
Please enter the value : 14
The sum of even no. in this list = 60
```

5. Write a program that reverse a list using a loop.

Ans.
```
def reverse (list):
        list.reverse()
        return list
list = [10, 11, 12, 13, 14, 15]
print (reverse (list)
```
Output :
```
15, 14, 13, 12, 11, 10
```

6. Write a program to insert a value in a list at the specified location.

Ans.
```
vowel = ['a', 'e', 'i', 'u']
vowel. insert(3, 'o')
print ('updated list', vowel)
```
Output :
```
updated list ['a', 'e', 'i', 'o', 'u']
```

7. Write a program that creates a list of numbers from 1 to 50 that are either divisible by 3 or divisible by 6.

Ans.
```
n = [ ]
s = []
for x in range(1,51):
        n.append(x)
for x in range(1, 51):
        if(x%3 == 0) or (x%6 ==0):
                s.append(x)
print ("The numbers divisible by 3 or 6 is ", s)
```
Output :
```
The numbers divisible by 3 or 6 is
        [3, 6, 9, 5, 12, 15, 18, 21, 24, 27, 30, 33, 36,
                                        39, 42, 45, 48]
```

8. Write a program to create a list of numbers in the range 1 to 20. Then delete all the numbers from the list that are divisible by 3.

Ans.
```
num = [ ]
for x in range (1,21):
        num.append(x)
print ("The list of numbers from 1 to 20 =", num)
for index, i in enumerate(num):
        if(i % 3 == 0)
                del num[index]
print("The list after deleting numbers", num)
```
Output :
```
The list of numbers from 1 to 20 = [1,2,3,4 ... 20]
The list after deleting numbers [1, 2, 4, 5, 7, 8, 10,
                        11, 13, 14, 16, 17, 19, 20]
```

9. Write a program that counts the number of times a value appears in the list. Use a loop to do the same.

Ans.
```
a = []
n = int(input"Enter number of elements :"))
for i in range(1, n+1)
        b = int(input("Enter element"))
        a.append(b)
k = 0
num = int(input("Enter the number to be
                                    counted :"))
for j in a :
        if (j ==num):
                k = k +1
print("Number of times", num, "appears is", k)
```
Output :
```
Enter number of elements : 4
Enter element : 23
Enter element : 45
Enter element : 23
Enter element : 67
Enter the number to be counted : 23
Number of times 23 appears is 2
```

10. Write a program that prints the maximum and minimum value in a dictionary.

Ans.
```
my_dict = {'x' : 500, 'y' : 5874, 'z' : 560}
val = my_dict . values ()
print ('max value', max (val))
print ("min value', min (val))
```
Output :
```
max value   5874
min value    500
```

PTA Questions and Answers

1 MARK

1. Which function is used to find length of a list in Python? *[PTA-3]*

(a) for() (b) range()
(c) len() (d) length

[Ans. (c) len ()]

2. Which Functrion is used to generate a series of values in Python? *[PTA-4]*

(a) series() (b) range()
(c) list() (d) tuple()

[Ans. (b) range()]

3. Which is a mutable and unordered collection of elements without duplicates? *[PTA-5]*

(a) List (b) Tuple
(c) Set (d) Dictionary

[Ans. (c) Set]

4. How many elements are in the list given below? *[PTA-6]*

MyList=[78, 91, 34, [32, 61, 85], 65]

(a) 3 (b) 4 (c) 5 (d) 7

[Ans. (d) 7]

2 MARKS

1. Write the syntax of creating dictionary in Python. *[PTA-1]*

Ans. **Syntax**

Dict = { expression for variable in sequence [if condition]}

2. What will be the output of the following snippet? *[PTA-2]*
```
Mydict={chr(x):x for x in range(97, 102)}
print(Mydict)
```
Ans. **Output :**

{97:98, 98:99, 99:100, 100:101, 101:102}

3. What will be the output of the following snippet? *[PTA-3]*
```
set_A = {'A', 2, 4 'D'}
set_B = {'A', 'B', 'C', 'D'}
print(set_A & set_B)
```
Ans. **Output :**

{'A', 'D'}

4. What are the collection data types available in Python? *[PTA-6]*

Ans. Python programming language has four collections of data types such as List, Tuples, Set and Dictionary.

3 MARKS

1. Write execution table for the following Python code. *[PTA-1]*
```
Marks=[10, 20, 30, 40, 50]
i = 0
sum = 0
while i < 4:
    sum+=Marks[i]
    i+=1
```
Ans.

Iteration	i	while i<4	print (Marks[i])	i = i+1
1.	0	0<4 True	Marks [0] = 10	0+1 =1
2.	1	1<4 True	Marks [1] = 20	1+1 =2
3.	2	2<4 True	Marks [2] = 30	2+1 =3
4.	3	3<4 True	Marks [3] = 40	3+1 =4
5.	4	4<4 False	Marks [4] = 50	4+1 =5

2. Write a simple python program with list of five marks and print the sum of all the marks using while loop. *[PTA-5]*

Ans.
```
marks=[]
subjects=['Tamil', 'English', 'Physics',
                'Chemistry', 'Comp. Science']
for i in range(5):
    m=int(input("Enter Mark = "))
    marks.append(m)
for j in range(len(marks)):
    print("{ }. { } Mark = { }
            ".format(j1+,subjects[j],marks[j]))
print("Total Marks = ", sum(marks))
```
Output :
```
Enter Mark = 45
Enter Mark = 98
Enter Mark = 76
Enter Mark = 28
Enter Mark = 46
1. Tamil Mark = 45
2. English Mark = 98
3. Physics Mark = 76
4. Chemistry Mark = 28
5. Comp. Science Mark = 46
Total Marks = 293
```

3. What is dictionary? *[PTA-3]*

Ans. **(i)** In Python, a dictionary is a mixed collection of elements. Unlike other collection data types such as a list or tuple, the dictionary type stores a key along with its element.

(ii) The keys in a Python dictionary is separated by a colon (:) while the commas work as a separator for the elements. The key value pairs are enclosed with curly braces { }.

5 MARKS

1. What will be the output of the following Python program? *[PTA-4]*

```
N = []
for x in range(1, 11):
    N.append(x)
Num=tuple(N)
print(Num)
for index, i in enumerate(N):
    if(i%2==1):
        del N[index]
print(N)
```

Ans. **Output :**

The list of numbers from 1 to 10 = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

The list after deleting even numbers = [1, 3, 5, 7, 9]

2. How would you access elements of a list? *[PTA-6]*

Ans. **(i)** Loops are used to access all elements from a list. The initial value of the loop must be zero. Zero is the beginning index value of a list.

(ii) Example :

```
Marks = [10, 23, 41, 75]
i = 0
while i < 4:
    print (Marks[i])
    i = i + 1
```

Output :

10
23
41
75

(iii) In the above example, Marks list contains four integer elements i.e., 10, 23, 41, 75. Each element has an index value from 0. The index value of the elements are 0, 1, 2, 3 respectively.

(iv) Here, the while loop is used to read all the elements. The initial value of the loop is zero, and the test condition is i < 4, as long as the test condition is true, the loop executes and prints the corresponding output.

(v) During the first iteration, the value of i is **zero**, where the condition is true. Now, the following statement **print** (**Marks [i]**) gets executed and prints the value of Marks [0] element ie. 10.

(vi) The next statement **i = i + 1** increments the value of i from **0** to 1. Now, the flow of control shifts to the while statement for checking the test condition. The process repeats to print the remaining elements of **Marks** list until the test condition of while loop becomes false.

The following table shows that the execution of loop and the value to be print.

Iteration	i	while i < 4	print (Marks[i])	i = i + 1
1	0	0 < 4 True	Marks [0] = 10	0 + 1 = 1
2	1	1 < 4 True	Marks [1] = 23	1 + 1 = 2
3	2	2 < 4 True	Marks [2] = 41	2 + 1 = 3
4	3	3 < 4 True	Marks [3] = 75	3 + 1 = 4
5	4	4 < 4 False	- -	- -

Government Exam Questions and Answers

1 MARK

1. Which command deletes the elements and it retains list. *[QY-2019]*

(a) remove()
(b) del()
(c) Clear()
(d) Pop()

[Ans. (c) Clear()]

2. ___ is the mixed collection of elements. *[QY-2019]*

(a) Lists
(b) Sets
(c) Dictionary
(d) Tuples

[Ans. (c) Dictionary]

2 MARKS

1. What will be the output of the following snippet? *[Govt. MQP-2019]*

```
alpha=list(range(65, 70))
for x in alpha:
    print(chr(x), end='\t')
```

Ans. **Output :**

65
66
67
68
69
70

5 MARKS

1. Compare remove(), pop() and clear() function in Python. *[Govt. MQP-2019]*

Ans.

	remove()	pop()	clear()
1.	remove() function is used to delete elements of a list if its index is unknown.	pop() function deletes and returns the last element of a list if the index is not given.	The function clear() is used to delete all the elements in list, it deletes only the elements and retains the list.
2.	Removes element from the set.	Removes an arbitrary element.	Removes all elements from a set.

2. Mylist = [10, 20, 30, 49, 50, 60, 70, 80, 90, 100]
Write the Python commands for the following based on above list. *[HY-2019]*

i) **To print all elements in list.**
ii) **Find list length.**
iii) **Add multiple elements [110, 120, 130]**
iv) **Delete from fourth element to seventh element.**
v) **Delete entire list.**

Ans. i)
```
Mylist.[10, 20, 30, 40, 50, 60, 70, 80, 90, 100]
for x in mylist:
print (x)
```

ii)
```
Mylist = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]
len (Mylist)
```

iii)
```
Mylist.extend ([110, 120, 130])
print (Mylist)
```

iv)
```
del Mysubjects[3:7]
```

v)
```
del (Mylist)
```

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. How many collection of datatypes in python?
(a) 3 (b) 4 (c) 2 (d) 5
[Ans. (b) 4]

2. Which of the following is not datatype in Python?
(a) List (b) Tuples
(c) String (d) Set
[Ans. (c) String]

3. Which of the following is an ordered collection of values?
(a) Set (b) Tuples
(c) List (d) Dictionary
[Ans. (c) List]

4. Which of the following datatype enclosed with [ ]?
(a) Tuples (b) List
(c) Dictionary (d) Set
[Ans. (b) List]

5. In list, the negative index number begin with
(a) 0 (b) 1 (c) – 1 (d) 0.1
[Ans. (c) –1]

6. a = ['A', 2, 3, [4, 5, 6]] is an example of
(a) Tuple (b) Set
(c) List (d) Dictionary
[Ans. (c) List]

7. Which of the following can be used to access an element in a list?
(a) Subscript (b) Function
(c) Integer (d) Identifier
[Ans. (a) Subscript]

8. In li = [10, 23, 41, 75], the negative index value of 41 is
(a) 2 (b) – 1 (c) – 2 (d) – 3
[Ans. (c) –2]

9. If python sets – 1 as the index value for the last element is called
(a) Oppositive indexing (b) Tuple indexing
(c) Reverse index (d) List indexing
[Ans. (c) Reverse index]

10. How many times the following loop executes?

```
li = [10, 23, 41, 75]
i = 0
while i > = – 4:
        print (li [i])
        i + = 1
```

(a) – 4 (b) 4
(c) 0 (d) Error

[Ans. (d) Error]

11. Which function is used to set the upper limit in a loop to read all elements of a list?

(a) upper () (b) limit
(c) len () (d) loop ()

[Ans. (c) len ()]

12. What is the output from the following?

```
li = ['T', 'E', 'C', 'M']
for i in li:
        print (li [1])
```

(a) T (b) E (c) C (d) M

[Ans. (b) E]

13. Which of the following operator can be used to alter the range of elements in the list?

(a) = = (b) : (c) : : (d) =

[Ans. (d) =]

14. Which function is used to add a single element to an existing list?

(a) add () (b) extend ()
(c) append () (d) addlist ()

[Ans. (c) append ()]

15. Which of the following function is used to add more than one element in an existing list?

(a) append () (b) extend ()
(c) more () (d) addmore ()

[Ans. (b) extend ()]

16. Predict the output for the following.

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

(a) 34, 45, 48, 90 (b) 90, 34, 45, 48
(c) 34, 45, 90, 48 (d) 34, 45, 90, 48

[Ans. (a) 34, 45, 48, 90]

17. Which of the following function used to include multiple element in the list?

(a) append () (b) extend ()
(c) insert () (d) endlist ()

[Ans. (b) extend ()]

18. Which of the following function used to include an element in a list at a desired position?

(a) append () (b) extend ()
(c) insert () (d) format ()

[Ans. (c) insert ()]

19. How many ways to delete and element from a list?

(a) 2 (b) 3
(c) 4 (d) None of these

[Ans. (a) 2]

20. Which of the following statement is used to delete an element from the list?

(a) Remove (b) Del
(c) Delete (d) Case

[Ans. (b) Del]

21. Which of the following is used to delete known elements where the index value is known?

(a) del (b) delete
(c) remove () (d) del ()

[Ans. (c) remove ()]

22. Which of the following function is used to delete one or more elements in the list where the index value is not known

(a) del () (b) remove ()
(c) delete () (d) delmore ()

[Ans. (b) remove ()]

23. Which of the following command deletes only the elements in the list?

(a) del () (b) pop ()
(c) clear () (d) remove ()

[Ans. (c) clear ()]

24. Which of the following function is used to delete only are element from a list?

(a) pop () (b) del
(c) delete () (d) clear ()

[Ans. (a) pop ()]

25. How many argument used in the range function?

(a) 3 (b) 4
(c) 2 (d) Only one

[Ans. (a) 3]

26. Which function is used to convert the result of range () function in to list?

(a) convert () (b) range ()
(c) list () (d) listrange ()

[Ans. (c) list ()]

27. What is the output for the following?

```
li = list (range (2, 5, 2))
print (li)
```

(a) [2, 4] (b) [2, 3, 4]
(c) [2, 3, 4, 5] (d) [2, 3, 4]

[Ans. (a) [2, 4]

28. What is the output for the following?

```
s = [i * * 2 for x in range (1, 2)]
print (s)
```

(a) [1, 4] (b) [1, 2]
(c) [1] (d) (1, 4)
(e) (1) **[Ans. (c) [1]]**

29. Which of the following is a simplest way of creating sequence of elements that satisfy certain condition?
(a) Tuple comprehension (b) Dictionary
(c) Set comprehension
(d) List comprehension
[Ans. (d) List comprehension]

30. Which of the following function returns the number of similar elements present in the list?
(a) element () (b) count ()
(c) return () (d) find ()
[Ans. (b) count ()]

31. If reverse is set as True, list sorting is in
(a) ascending order (b) descending order
(c) no sorting (d) multiple sorting
[Ans. (c) no sorting]

32. Using sort (), the default sorting is
(a) ascending (b) descending
(c) no sorting (d) criteria sorting
[Ans. (a) ascending]

33. Which of the following argument is optional in sort ()?
(a) Reverse (b) Key
(c) True / false (d) a and b
[Ans. (d) a and b]

34. What is the output for the following?
li = [36, 12, 12]
x = mylist. index (12)
print (x)
(a) 0 (b) 1 (c) 2 (d) 1.5
[Ans. (b) 1]

35. Which of the following can be defined with or without ()?
(a) list (b) set
(c) dictionary (d) none of these
[Ans. (d) none of these]

36. While creating a tuple from a list, the element should be enclosed with in
(a) [ ] (b) ( ) (c) { } (d) [( )]
[Ans. (a) [ ]]

37. Write the output for the following.
Tu = {1, 2, 4, 4, 5, 6}
print (Tu (4:))
(a) 4, 5, 6 (b) 6
(c) 5, 6 (d) 4, 4, 5, 6
[Ans. (c) 5, 6]

38. What is the output for the following?
(a, b) = (34)
(a) a = 34 (b) b = 34
(c) a = 34, b = 34 (d) Error
[Ans. (d) Error]

39. Which of the following is an unordered collection of elements without duplicates?
(a) List (b) Tuple
(c) Set (d) All of these
[Ans. (c) Set]

40. A set is created using
(a) [ ] (b) { }
(c) ( ) (d) { ( ) }
[Ans. (b) { }]

41. What is the output for the following?
a = {1, 2, 2, 3}
print (a)
(a) {1, 2} (b) {1, 2, 2, 3}
(c) {1, 2, 3} (d) {1, 2, 3}
[Ans. (d) {1, 2, 3}]

42. Which of the following operator is used to join two sets in python?
(a) & (b) ^ (c) | (d) %
[Ans. (c) |]

43. A = B | C is equivalent to
(a) A = B. set (c) (b) A = B. join (c)
(c) A = B. union (c) (d) A.B. Set (c)
[Ans. (c) A = B. union (c)]

44. Which of the following operator is used to intersect two sets in python?
(a) | (b) ^ (c) & (d) $
[Ans. (c) &]

45. B = A & C is equivalent to
(a) B = A. union (c)
(b) B = A. intersection (c)
(c) B = A. intersect (c)
(d) B = A. interest (c)
[Ans. (b) B = A. intersection (c)]

46. Write the output for the following
A = {1, 2, 4, 5}
B = {1, 6, 7, 5}
print (A + B)
(a) {1, 2, 4, 5, 6, 7} (b) [2, 4]
(c) {2, 4} (d) (2, 4)
[Ans. (c) {2, 4}]

47. Write the output for the following.
A = {'A', 2, 4, 'D'}
B = {'A', 'B', 'C', 'D'}
print (B - A)
(a) {'B', 'C'} (b) {2, 4}
(c) (2, 4) (d ('B', 'C')
[Ans. (a) {'B', 'C'}]

48. Which of the following is enclosed with {}?
(a) List (b) Tuple
(c) Key value pairs (d) Dictionary
[Ans. (c) Key value pairs]

49. Which of the following can be used to access a particular element in a dictionary?
(a) { } (b) [ ] (c) ( ) (d) < >
[Ans. (b) [ ]

MATCH THE FOLLOWING

1.	i)	^	1)	Intersection
	ii)	|	2)	Difference
	iii)	&	3)	Union
	iv)	–	4)	Symmetric difference

(a) 1, 2, 4, 3, (b) 4, 3, 1, 2
(c) 3, 4, 1, 2 (d) 4, 3, 2, 1
[Ans. (b) 4, 3, 1, 2]

CHOOSE AND FILL IN THE BLANKS

1. A _____ in Python is known as a "sequence datatype"
(a) List (b) Set
(c) Dictionary (d) Tuples
[Ans. (a) List]

2. A list is enclosed with _____
(a) { } (b) ( ) (c) < > (d) [ ]
[Ans. (d) [ ]]

3. In list, the positive index number always begin with _____
(a) Zero (b) One
(c) – 1 (d) 0.0
[Ans. (b) One]

4. In python, ___ is an integer number which can be positive or negative.
(a) Identifier (b) Keyword
(c) Operators (d) Index value
[Ans. (d) Index value]

5. _____ are used to access all elements from a list.
(a) Branching (b) Loops
(c) Alternative (d) Functions
[Ans. (b) Loops]

6. A list element can be changed using _____ operator.
(a) Arithmetic (b) Conditional
(c) Binary (d) Assignment
[Ans. (d) Assignment]

7. Using append () function, and additional value is included with the existing list as ____ element.
(a) first (b) second
(c) middle (d) last
[Ans. (d) last]

8. Fill up the blank. dellist [index from _____ index to]
(a) : (b) . (c) : : (d) ;
[Ans. (a) :]

9. The ____ function deletes and returns the last element of a list if the index is not given?
(a) del () (b) remove ()
(c) pop () (d) push ()
[Ans. (c) pop ()]

10. Tuples are enclosed with _____
(a) [ ] (b) { } (c) ( ) (d) < >
[Ans. (a) [ ]]

11. _____ represents an abstraction of the sequence of numbers
(a) Dictionary (b) List
(c) Set (d) Tuple
[Ans. (d) Tuple]

12. Iterating ____ is faster than list.
(a) List (b) Set
(c) Tuples (d) Dictionary ()
[Ans. (c) Tuples]

13. While creating a tuple with a single element, add a _____ at the end of the element.
(a) : (b) . (c) , (d) : :
[Ans. (c) ,]

14. The _____ com can be used to delete an entire tuple
(a) del (b) delete
(c) remove (d) deletetuple
[Ans. (a) del]

15. _____ is a powerful feature in python.
(a) Tuple assignment (b) List assignment
(c) Assignment statement (d) Set
[Ans. (a) Tuple assignment]

16. Python return ____ value from a function
(a) Only One (b) Only Two
(c) Only Three (d) More than are
[Ans. (d) More than are]

17. In a nested tuple, each tuple is considered as a (n)_____
(a) Function (b) Tuple
(c) List (d) Set
[Ans. (b) Tuple]

18. A list or tuple can be converted as set by using _____ function.
(a) List () (b) Tuple ()
(c) Setlt () (d) Set ()
[Ans. (d) Set ()]

19. The function _____ is used to join to sets in python.
(a) Join () (b) Union ()
(c) Join set () (d) Set ()
[Ans. (b) Union ()]

20. The_____ operator is used to find symmetric difference set operation in python
(a) | (b) ^ (c) & (d) @
[Ans. (b) ^]

21. The keys in a python dictionary is separated by a ____
(a) ; (b) : : (c) : (d) ,
[Ans. (c) :]

Choose the correct statement

1. (i) The append (), insert () and extend () functions are used to include more elements in a tuple.
(ii) The remove () and pop are used to delete elements from a set.
(iii) Creating a Tuple with are element is called 'Singleton' Tuple.
(iv) A Dictionary is a collection of element of sametype.
(a) i and iii (b) ii and iv
(c) i and iv (d) iv only
[Ans. (d) iv only]

Choose the correct pair

1. (a) – union
(b) – – intersection
(c) ^ – Symmetric difference
(d) & – Difference
[Ans. (c) ^ – Symmetric difference]

2. (a) List = { }
(b) Set = [ ]
(c) Tuple = ( )
(d) Dictionary = ( ) **[Ans. (c) Tuple = ( )]**

Choose the incorrect statement

1. (i) A list in python is not a sequence data type
(ii) The elements of list should be specified with in [ ]
(iii) A list can be immutable.
(iv) A list contains another list as an element
(a) i and iii (b) ii and iv
(c) ii and iii (d) i, ii and iv
[Ans. (a) i and iii]

2. (i) List function does not takes the result of range ()
(ii) Both the arguments are not optional in sort ()
(iii) List comprehension is a simplest way of creating sequence of elements
(iv) Tuple values are immutable
(a) i and iv (b) ii and iii
(c) i and ii (d) iii only
[Ans. (c) i and ii]

3. (i) List are immutable
(ii) Tuples are mutable
(iii) Tuples are enclosed in [ ] and also ( )
(iv) Iterating list is faster than tuples.
(a) i, ii (b) i, iii, iv
(c) ii, iv (d) All of these
[Ans. (d) All of these]

Choose the incorrect pair

1. (a) + – union
(b) ^ – Symmetric difference
(c) – – Difference
(d) & – Intersection **[Ans. (a) + – union]**

2. (a) List = [ ]
(b) Tuple = { }
(c) Set = { }
(d) Dictionary = { } **[Ans. (b) Tuple = { }]**

Very Short Answers **2 MARKS**

1. **Write the syntax of creating list. Give example.**

Ans. **Syntax:**

Variable = [element-1, element-2, element-3 ..... element-n]

Example :
Marks = [10, 23, 41, 75]
Fruits = ["Apple", "Orange", "Mango", "Banana"]
MyList = [ ]

2. What is nested list? Give example.

Ans. **(i)** Mylist contains another list as an element. This type of list is known as "Nested List". Nested list is a list containing another list as an element.

(ii) Example :

Mylist = ["Welcome", 3.14, 10, [2, 4, 6]]

3. Fill up the following to get the output:

10, 23, 41, 75

Marks = [10, 23, 41, 75]

(i)
while i (ii) 4:
print ((iii))
i = (iv)

Ans. **(i)** i = 0

(ii) <

(iii) Marks [i]

(iv) i + 1

4. Write a program to print all elements in the list using reverse indexing.

Ans.
```
Marks = [10, 23, 41, 75]
i = -1
while i >= -4:
print (Marks[i])
i = i + -1
```
Output :
```
75
41
23
10
```

5. Write a program to display element in a list ("Physics", "Chemistry", "Biology") using loop to get the output

Physics
Chemistry
Biology

Ans.
```
MySubject = ["Physics", "Chemistry", "Biology"]
i = 0
while i < len(MySubject):
    print (MySubject[i])
    i = i + 1
```

6. Write a syntax that shows the lists are mutable.

Ans. **Syntax:**

List_Variable [index of an element] = Value to be changed

List_Variable [index from : index to] = Values to be changed

7. Write the output for the following code?
```
list = [2, 4, 6]
list [0:3] = [1, 3, 5]
    for x in list:
print (x)
```
Ans. **Output : 1**
```
3
5
```

8. Differentiate append () and extend () function.

Ans. 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.

9. How will you insert elements in a list? Write the syntax.

Ans. **(i)** To include an element at your desired position, you can use insert ( ) function. The insert( ) function is used to insert an element at any position of a list.

(ii) Syntax :

List.insert (position index, element)

10. Write the syntax of append () and extend () function.

Ans. **Syntax :**

List.append (element to be added)

List.extend ([elements to be added])

11. Write the syntax of deleting elements from the list.

Ans. **Syntax :**
```
del List [index of an element]
# to delete a particular element
del List [index from : index to]
# to delete multiple elements
del List
# to delete entire list
```

12. How will you delete the elements from the list if the index value is not known?

Ans. The remove( ) function can also be used to delete one or more elements if the index value is not known.

13. State the working of pop () and clear () function.

Ans. **(i) pop( ) function :** pop( ) function can also be used to delete an element using the given index value. pop( ) function deletes and returns the last element of a list if the index is not given.

(ii) clear ( ) function : The function clear( ) is used to delete all the elements in list, it deletes only the elements and retains the list.

14. Write the output for the following code

(i) print (list (range (1, 11, 2)))

(ii) print (list (range(2, 11, 2)))

Ans. **Output :**

(i) [1, 3, 5, 7, 9]

(ii) [2, 4, 6, 8, 10]

15. Write a python program to print the following output [36, 49, 64, 81, 100]

Ans.
```
s = []
for x in range (6, 11)
    a = x * * 2
        s. append (a)
        print (s)
```

16. Write a python program to generate the squares of even numbers between 1 and 10 using the concept of list comprehensions.

Ans.
```
s = [x ** 2 for x in range (2, 11, 2)]
print (s)
```

17. What is output for the following code?

```
list = ['T', 'T', 'A', 'S', 'L']
list. sort (reverse = false)
print (list)
```

Ans. **Output :**

['A', 'L', 'S', 'T', 'T']

18. Write a program that creates a list of numbers from 1 to 20 that are divisible by 4

Ans.
```
divBy4=[ ]
for i in range(21):
    if (i%4==0):
        divBy4.append(i)
print(divBy4)
```

Output :

[0, 4, 8, 12, 16, 20]

19. What is Tuple in python?

Ans. Tuples consists of a number of values separated by comma and enclosed within parentheses. Tuple is similar to list, values in a list can be changed but not in a tuple.

20. Write the syntax of defining tuple.

Ans. **Syntax :**

```
# Empty tuple
Tuple_Name = ( )
# Tuple with n number elements
Tuple_Name = (E1, E2, E2 ……. En)
# Elements of a tuple without parenthesis
Tuple_Name = E1, E2, E3 ….. En
```

21. What is the use of tuple () function? Give example.

Ans. **(i)** The tuple( ) function is used to create Tuples from a list. When you create a tuple from a list, the elements should be enclosed within square brackets.

(ii) Example :

```
MyTup3 = tuple( [23, 45, 90] )
>>> print(MyTup3)
(23, 45, 90)
```

22. Write the output

```
tup = (10)
type (tup)
tup1 = (10,)
type (tup)
```

Ans. **Output :**

```
<class 'int'>
<class 'tuple'>
```

23. Give an example of joining two tuples.

Ans.
```
# Program to join two tuples
Tup1 = (2,4,6,8,10)
Tup2 = (1,3,5,7,9)
Tup3 = Tup1 + Tup2
print(Tup3)
```

Output :

(2, 4, 6, 8, 10, 1, 3, 5, 7, 9)

24. Write a program to swap two values using tuple assignment.

Ans.
```
a = int(input("Enter value of A: "))
b = int(input("Enter value of B: "))
print("Value of A = ", a, "\n Value of B = ", b)
(a, b) = (b, a)
print("Value of A = ", a, "\n Value of B = ", b)
```

25. How will you create a set using list or tuple? Give an example.

Ans. A list or Tuple can be converted as set by using set( ) function. This is very simple procedure. First you have to create a list or Tuple then, substitute its variable within set( ) function as argument.

Example :

```
MyList=[2,4,6,8,10]
MySet=set(MyList)
print(MySet)
```

Output :

{2, 4, 6, 8, 10}

26. **Write the output.**

```
A = {'A', 2, 4, 'D'}
B = {'A', 'B', 'C', 'D'}
print (A | B)
print (A & B)
print (A - B)
print (A ^ B)
```

Ans. **Output :**

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

27. **Find the odd man out. Give reason**

(a) ^
(b) ¦
(c) +
(d) –

Ans. **(c)** (+). Because + is not a set operations.

SHORT ANSWERS — 3 MARKS

1. **How will you find the length of a list? Explain with an example.**

Ans.
(i) The len( ) function in Python is used to find the length of a list. (i.e., the number of elements in a list).
(ii) Usually, the len( ) function is used to set the upper limit in a loop to read all the elements of a list.
(iii) If a list contains another list as an element, len( ) returns that inner list as a single element.
(iv) **Example :** Accessing single element

```
>>> MySubject = ["Tamil", "English", "Comp. Science", "Maths"]
>>> len(MySubject)
4
```

2. **Fill up the following program to get the output TECM.**

```
list = ['T', 'E', 'C', 'M']
i = 0
(i) while _____:
(ii) _____ (MySubject[i], _____)
(iii) _____ i = i + 1
```

Ans.
(i) i < len (list)
(ii) print
(iii) end = '\t'

3. **How will you change the list elements in Python? Give an example.**

Ans. In Python, the lists are mutable, which means they can be changed. A list element or range of elements can be changed or altered by using simple assignment operator (=).

Example :

```
MyList = [1, 3, 5, 7, 9]
print ("List Odd numbers... ")
for x in MyList:
    print (x)
MyList[0:5] = 2,4,6,8,10
print ("List Even numbers... ")
for y in MyList:
    print (y)
```

4. **What is the output for the following code?**

```
MyList = [2, 4, 5, 8, 10]
print ("MyList elements before update... ")
for x in MyList:
    print (x)
MyList[2] = 6
print ("MyList elements after updation... ")
for y in MyList:
    print (y)
```

Ans. **Output :**

```
MyList elements before update...
2
4
5
8
10
MyList elements after updation...
2
4
6
8
10
```

5. **What is the output of the following code?**

```
(i) list = [34, 45, 48]
    print (list. append (80))
(ii) list = [34, 45, 48]
    print (list. extend (80, 90))
(iii) list = [34, 98, 47, 55]
    list. insert (3, 90)
    print (list)
```

Ans. **Output :**

(i) 34, 45, 48, 80
(ii) 34, 45, 48, 80, 90
(iii) [34, 98, 47, 90, 55]

6. **Read the following program and write the output according to the print statement mentioned**

list = ['T', 'H', 'N', 'M']
del list [1]
(i) print (list)
del list [1:3]
(ii) print (list)'
del list
(iii) print (list)

Ans. **Output:**
(i) ['T','N', 'M']'
(ii) ['T'
(iii) Error

7. **Write the syntax of remove (), pop () and clear().**

Ans. **Syntax :**
(i) **remove ( )** : *List.remove(element) # to delete a particular element*
(ii) **pop ( )** : *List.pop(index of an element)*
(iii) **clear ( )** : *List.clear( )*

8. **Read the following and write the output given by the print function mentione(d)**

list = [12, 89, 34, 79, 80]
(i) print (list. remove (34))
(ii) print (list. pop (1))
(iii) print (list. clear ())

Ans. **Output :**
(i) 12, 89, 79, 80
(ii) 12, 79, 80
(iii) []

9. **Write a note on list comprehensions.**

Ans. **(i)** List comprehension is a simplest way of creating sequence of elements that satisfy a certain condition.
(ii) **Syntax :**
List = [expression for variable in range]
(iii) **Example :** Generating squares of first 10 natural numbers using the concept of List comprehension.

```
>>> squares = [ x ** 2 for x in range(1,11) ]
>>> print (squares)
```

Output :
[1, 4, 9, 16, 25, 36, 49, 64, 81, 100]

10. **Write the output for the following.**

list = [36, 12, 12]
(i) print (list. count (12))
(ii) print (list. index (12))
(iii) print (list. reverse ())

Ans. **Output :**
(i) 2
(ii) 1
(iii) [12, 12, 36]

11. **Write a program to define a list of countries that are a member of BRICS. Check whether a county is member of BRICS or not.**

Ans.

```
country=["India", "Russia", "Srilanka", "China",
                                        "Brazil"]
is_member = input("Enter the name of the
                                    country: ")
if is_member in country:
    print(is_member, " is the member of
                                        BRICS")
else:
    print(is_member, " is not a member of
                                        BRICS")
```

Output :

Enter the name of the country: India
India is the member of BRICS

Output :

Enter the name of the country: Japan
Japan is not a member of BRICS

12. **Differentiate list and tuple.**

Ans. **(i)** In a list, elements are defined within square brackets, whereas in tuples, they may be enclosed by parenthesis.
(ii) The elements of a tuple can be even defined without parenthesis.
(iii) Whether the elements defined within parenthesis or without parenthesis, there is no differente in it's function.

13. **Explain with an example how will you create a tuple with a single element.**

Ans. **(i)** While creating a tuple with a single element, add a comma at the end of the element.
(ii) In the absence of a comma, Python will consider the element as an ordinary data type; not a tuple. Creating a Tuple with one element is called "Singleton" tuple.
(iii) **Example :**

```
>>> MyTup4 = (10)
>>> type(MyTup4)
        <class 'int'>
>>> MyTup5 = (10,)
>>> type(MyTup5)
        <class 'tuple'>
```

14. **Write the output for the following.**

Tup = (12, 78, 91, 'A', 'B', 3, 69)
1. **print (Tup1 [2:5])** _____**1**
2. **print (Tup [:5])** _____**2**
3. **print (Tup [4:])** _____**3**

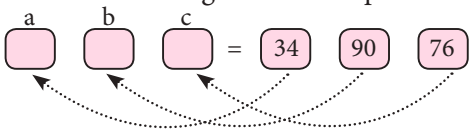
4. print (Tup [:]) _____4
5. print (Tup) _____ 5

Ans. **Output :**

1. (91, 'A', 'B')
2. (12, 78, 91, 'A', 'B')
3. ('B', 3, 69)
4. (12, 78, 91, 'A', 'B', 3, 69)
5. (12, 78, 91, 'A', 'B', 3, 69)

15. Write a note on Tuple assignment.

Ans. Tuple assignment is a powerful feature in Python. It allows a tuple variable on the left of the assignment operator to be assigned to the values on the right side of the assignment operator. Each value is assigned to its respective variable.



Example :

```
>>> (a, b, c) = (34, 90, 76)
>>> print(a,b,c)
    34 90 76
```

16. How will create a set in python? Give an example.

Ans. (i) A set is created by placing all the elements separated by comma within a pair of curly brackets. The set( ) function can also used to create sets in Python.

(ii) **Syntax :**

Set_Variable = {E1, E2, E3 …….. En}

(iii) **Example :**

```
>>> S1={1,2,3,'A',3.14}
>>> print(S1)
      {1, 2, 3, 3.14, 'A'}
>>> S2={1,2,2,'A',3.14}
>>> print(S2)
      {1, 2, 'A', 3.14}
```

17. How will delete an entire tuple? Give an example.

Ans. (i) To delete an entire tuple, the del command can be used.

(ii) **Syntax :** *del tuple_name*

(iii) **Example :**

```
Tup1 = (2,4,6,8,10)
print("The elements of Tup1 is ", Tup1)
del Tup1
print (Tup1)
```

18. Write the equivalent python statement for the following

(i) **C = A | B**

(ii) **C = A & B**

(iii) **C = A – B**

(iv) **C = A ^ B**

Ans. (i) C = A. union (B)

(ii) C = A. intersection (B)

(iii) C = A. difference (B)

(iv) C = A. symmetric _ difference (B)

19. Write a note on dictionary comprehension.

Ans. (i) In Python, comprehension is another way of creating dictionary. The following is the syntax of creating such dictionary.

(ii) **Syntax :**

Dict = { expression for variable in sequence [if condition] }

(iii) The if condition is optional and if specified, only those values in the sequence are evaluated using the expression which satisfy the condition.

(iv) **Example :**

```
Dict = { x : 2 * x for x in range(1,10)}
```

Output of the above code is

```
{1: 2, 2: 4, 3: 6, 4: 8, 5: 10, 6: 12, 7: 14, 8: 16,
9: 18}
```

20. Fill up the blanks in the following.

(i) **Dict = {'Roll No' : 12001, 'SName' : 'Meena','Mark1' : 98, 'Marl2' : 86}**

print("Dictionary elements before deletion: \n", Dict)

del Dict['Mark1] # _____

(ii) **print("Dictionary elements after deletion of a element: \n", Dict)**

Dict.clear() # _____

(iii) **print("Dictionary after deletion of all elements: \n", Dict) del Dict**

print(Dict) # _____

Ans. (i) # Deleting a particular element

(ii) # Deleting all elements

(iii) # Deleting entire dictionary

21. Write a note on the following function used in list.

Ans.

max( )	Returns the maximum value in a list.	max (list)	MyList=[21,76,98,23] print(max(MyList)) **Output :** 98
min( )	Returns the minimum value in a list.	min (list)	MyList=[21,76,98,23] print(min(MyList)) **Output :** 21
sum( )	Returns the sum of values in a list.	sum (list)	MyList=[21,76,98,23] print(sum(MyList)) **Output :** 218

LONG ANSWERS 5 MARKS

1. How will you access elements of a list using for loop? Explain with an example.

Ans.

(i) In Python, 'for loop' is used to access all the elements in a list one by one. This is just like the for keyword in other programming language such as C++.

(ii) **Syntax :**

for index_var in list:
print (index_var)

(iii) Here, ***index_var*** represents the index value of each element in the list. Python reads this "for" statement like English: *"For (every) element in (the list of) list and print (the name of the) list items"*

(iv) **Example :**

```
Marks=[23, 45, 67, 78, 98]
for x in Marks:
    print( x )
```

Output :

```
23
45
67
78
98
```

(v) In the above example, Marks list has 5 elements; each element is indexed from 0 to 4.

(vi) The Python reads the ***for*** loop and ***print*** statements like English: "For (every) element (represented as x) in (the list of) Marks and print (the values of the) elements".

2. Explain remove (), pop () and clear () used in list with an example.

Ans. **remove ( ) :**

(i) The remove( ) function can also be used to delete one or more elements if the index value is not known.

(ii) **Syntax:**

List.remove(element) # to delete a particular element

(iii) **Example :**

```
>>>MyList=[12,89,34,'Kannan', 'Gowri sankar', 'Lenin']
>>> print(MyList)
    [12, 89, 34, 'Kannan', 'Gowrisankar', 'Lenin']
>>> MyList.remove(89)
>>> print(MyList)
    [12, 34, 'Kannan', 'Gowrisankar', 'Lenin']
```

pop ( ):

(i) pop( ) function can also be used to delete an element using the given index value. pop( ) function deletes and returns the last element of a list if the index is not given.

(ii) pop( ) function is used to delete a particular element using its index value, as soon as the element is deleted.

(iii) The pop( ) function shows the element which is deleted. pop( ) function is used to delete only one element from a list. Remember that, del statement deletes multiple elements.

(iv) **Syntax:** *List.pop(index of an element)*

(v) **Example :**

```
>>> MyList.pop(1)
    34
>>> print(MyList)
    [12, 'Kannan', 'Gowrisankar', 'Lenin']
```

clear ( ) :

(i) The function clear( ) is used to delete all the elements in list, it deletes only the elements and retains the list.

(ii) clear( ) function removes only the elements and retains the list. When you try to print the list which is already cleared, an empty square bracket is displayed without any elements, which means the list is empty.

(iii) **Syntax:**

List.clear( )

Example :

```
>>> MyList.clear( )
>>> print(MyList)
    [ ]
```

3. Explain the following function used in list function with an example.

(i) copy ()
(ii) count ()
(iii) index ()
(iv) reverse ()

Ans. **(i) copy ( ) :** Returns a copy of the list.

Syntax : List.copy( )

Example :

```
MyList=[12, 12, 36]
x = MyList.copy()
print(x)
```

Output :

[12, 12, 36]

(ii) count ( ) : Returns the number of similar elements present in the last.

Syntax: List.count(value)

Example :

```
MyList=[36 ,12 ,12]
x = MyList.count(12)
print(x)
```

Output :

2

(iii) index ( ) : Returns the index value of the first recurring element.

Syntax: List.index(element)

Example :

```
MyList=[36 ,12 ,12]
x = MyList.index(12)
print(x)
```

Output :

0

(iv) reverse ( ) : Reverses the order of the element in the list.

Syntax: List.reverse( )

Example :

```
MyList=[36 ,23 ,12]
MyList.reverse()
print(MyList)
```

Output :

[12 ,23 ,36]

4. Write a python program to read marks of six subjects and to print the marks scored in each subject and show the total marks.

Ans. **Program :**

```
marks=[]
subjects=['Tamil','English','Physics','Chemistry',
    'Comp. Science', 'Maths']
for i in range(6):
    m=int(input("Enter Mark = "))
    marks.append(m)
for j in range(len(marks)):
    print("{ }. { } Mark =
        { } ".format(j1+,subjects[j],marks[j]))
print("Total Marks = ", sum(marks))
```

Output :

```
Enter Mark = 45
Enter Mark = 98
Enter Mark = 76
Enter Mark = 28
Enter Mark = 46
Enter Mark = 15
1.  Tamil Mark          = 45
2.  English Mark        = 98
3.  Physics Mark        = 76
4.  Chemistry Mark      = 28
5.  Comp. Science Mark  = 46
6.  Maths Mark          = 15
    Total Marks         = 308
```

5. Write a python program to read prices of 5 items in a list and then display sum of all the prices, product of all the prices and find the average.

Ans. **Program :**

```
items=[]
prod=1
for i in range(5):
    print ("Enter price for item { } :
                                ".format(i+1))
    p=int(input())
    items.append(p)
for j in range(len(items)):
    print("Price for item { } =
                    Rs. { }".format(j+1,items[j]))
    prod = prod * items[j]
print("Sum of all prices = Rs.", sum(items))
print("Product of all prices = Rs.", prod)
print("Average of all prices = Rs.",sum(items)/
                                len(items))
```

Output :

```
Enter price for item 1 :
5
Enter price for item 2 :
10
Enter price for item 3 :
15
Enter price for item 4 :
20
Enter price for item 5 :
25
Price for item 1          = Rs. 5
Price for item 2          = Rs. 10
Price for item 3          = Rs. 15
Price for item 4          = Rs. 20
Price for item 5          = Rs. 25
Sum of all prices         = Rs. 75
Product of all prices     = Rs. 375000
Average of all prices     = Rs. 15.0
```

6. Write a python program to count the number of employees earning more than 1 lakh per annum. The monthly salaries of n number of employees are given.

Ans. **Program :**

```
count=0
n=int(input("Enter no. of employees: "))
print("No. of Employees",n)
salary=[]
for i in range(n):
    print("Enter Monthly Salary of Employee { } Rs.: ".format(i+1))
    s=int(input())
    salary.append(s)
for j in range(len(salary)):
    annual_salary = salary[j] * 12
    print ("Annual Salary of Employee { } is:Rs. { }".format(j+1,annual_salary))
    if annual_salary >= 100000:
        count = count + 1
print("{ } Employees out of { } employees are earning more than Rs. 1 Lakh per annum".format(count, n))
```

Output :

```
Enter no. of employees: 5
No. of Employees 5
Enter Monthly Salary of Employee 1 Rs.:
3000
Enter Monthly Salary of Employee 2 Rs.:
9500
Enter Monthly Salary of Employee 3 Rs.:
12500
Enter Monthly Salary of Employee 4 Rs.:
5750
Enter Monthly Salary of Employee 5 Rs.:
8000
Annual Salary of Employee 1 is:Rs. 36000
Annual Salary of Employee 2 is:Rs. 114000
Annual Salary of Employee 3 is:Rs. 150000
Annual Salary of Employee 4 is:Rs. 69000
Annual Salary of Employee 5 is:Rs. 96000
2 Employees out of 5 employees are earning more than Rs. 1 Lakh per annum
```

7. Write a program to create a list of numbers in the range 1 to 10. Then delete all the even numbers from the list and print the final list.

Ans. **Program :**

```
Num = []
for x in range(1,11):
    Num.append(x)
print("The list of numbers from 1 to 10 = ", Num)
for index, i in enumerate(Num):
    if(i%2==0):
        del Num[index]
print("The list after deleting even numbers = ", Num)
```

Output :

```
The list of numbers from 1 to 10 = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
The list after deleting even numbers = [1, 3, 5, 7, 9]
```

8. Write a program to create a list of numbers in the range 1 to 10. Then delete all the odd numbers from the list and print the final list.

Ans. **Program :**

```
n = []
for x in range (1, 11)
        n = append (x)
for x, i in enumerate (n):
        if (i %2 ! = 0):
        del n [x]
print (n)
```

9. Write a program to generate in the Fibonacci series and store it in a list. Then find the sum of all values.

Ans. **Program :**

```
a=-1
b=1
n=int(input("Enter no. of terms: "))
```

```
i=0
sum=0
Fibo=[]
while i<n:
    s = a + b
    Fibo.append(s)
    sum+=s
    a = b
    b = s
    i+=1
print("Fibonacci series upto "+ str(n) +" terms is
                                : " + str(Fibo))
print("The sum of Fibonacci series: ",sum)
```

Output :

```
Enter no. of terms: 10
Fibonacci series upto 10 terms is : [0, 1, 1, 2, 3, 5,
                                    8, 13, 21, 34]
The sum of Fibonacci series: 88
```

10. Explain with an example how will you return multiple values in tuples.

Ans. **(i)** A function can return only one value at a time, but Python returns more than one value from a function. Python groups multiple values and returns them together.

(ii) Example : Program to return the maximum as well as minimum values in a list

```
def Min_Max(n):
    a = max(n)
    b = min(n)
    return(a, b)
Num = (12, 65, 84, 1, 18, 85, 99)
(Max_Num, Min_Num) = Min_Max(Num)
print("Maximum value = ", Max_Num)
print("Minimum value = ", Min_Num)
```

(iii) Output :

```
Maximum value = 99
Minimum value = 1
```

11. Write a program using a function that returns the area and circumference of a circle whose radius is passed as an argument. Two values using tuple assignment.

Ans. **Program :**

```
pi = 3.14
def Circle(r):
    return (pi*r*r, 2*pi*r)
radius = float(input("Enter the Radius: "))
(area, circum) = Circle(radius)
print ("Area of the circle = ", area)
print ("Circumference of the circle = ", circum)
```

Output :

```
Enter the Radius: 5
Area of the circle = 78.5
Circumference of the circle =
                    31.400000000000002
```

12. Write a program that generate a set of prime numbers and another set of even numbers. Demonstrate the result of union, intersection, difference and symmetric difference operations.

Ans. **Program :**

```
even=set([x*2 for x in range(1,11)])
primes=set()
for i in range(2,20):
    j=2
    f=0
    while j<i/2:
        if i%j==0:
            f=1
        j+=1
    if f==0:
primes.add(i)
print("Even Numbers: ", even)
print("Prime Numbers: ", primes)
print("Union: ", even.union(primes))
print("Intersection: ", even.intersection(primes))
print("Difference: ", even.difference(primes))
print("Symmetric Difference: ", even.symmetric_
                        difference(primes))
```

Output :

```
Even Numbers: {2, 4, 6, 8, 10, 12, 14, 16, 18, 20}
Prime Numbers: {2, 3, 4, 5, 7, 11, 13, 17, 19}
Union: {2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16,
                                17, 18, 19, 20}
Intersection: {2, 4}
Difference: {6, 8, 10, 12, 14, 16, 18, 20}
Symmetric Difference: {3, 5, 6, 7, 8, 10, 11, 12,
                        13, 14, 16, 17, 18, 19, 20}
```

☆☆☆

CHAPTER 10

PYTHON CLASSES AND OBJECTS

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

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
[Ans. (c) Classes and Objects]

2. Functions defined inside a class:
(a) Functions (b) Module
(c) Methods (d) section
[Ans. (c) Methods]

3. Class members are accessed through which operator?
(a) & (b) . (c) # (d) %
[Ans. (b) .]

4. Which of the following method is automatically executed when an object is created?
(a) __object__( ) (b) __del__( )
(c) __func__( ) (d) __init__( )
[Ans. (d) __init__( )]

5. A private class variable is prefixed with
(a) __ (b) && (c) ## (d) **
[Ans. (a) __]

6. Which of the following method is used as destructor? *[PTA-1; QY-2019]*
(a) __init__( ) (b) __dest__( )
(c) __rem__( ) (d) __del__( )
[Ans. (d) __del__( )]

7. Which of the following class declaration is correct? *[PTA-6]*
(a) class class_name
(b) class class_name<>
(c) class class_name:
(d) class class_name[ ]
[Ans. (c) class class_name:]

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

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

(a) Error (b) Tamil
(c) name (d) self
[Ans. (b) Tamil]

9. **Which of the following is the private class variable?** *[PTA-2]*

(a) __num (b) ##num
(c) $$num (d) &&num

[Ans. (a) __num]

10. **The process of creating an object is called as:** *[HY-2019]*

(a) Constructor (b) Destructor
(c) Initialize (d) Instantiation

[Ans. (d) Instantiation]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. **What is class?** *[PTA-1]*

Ans. (i) Class is the main building block in Python.
(ii) Class is a template for the object.
(iii) Object is a collection of data and function that act on those data.
(iv) Objects are also called as instances of a class or class variable.

2. **What is instantiation?** *[PTA-6]*

Ans. Once a class is created, next to create an object or instance of that class. The process of creating object is called as "Class Instantiation".

Syntax :

```
Object_name = class_name( )
```

3. **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)
```

Ans. Output :

```
>>>
10
line 7, in <module>
    print(S._num)
AttributeError : 'Sample' object has no attribute '_num'
>>>
```

4. **How will you create constructor in Python?**

Ans. (i) **"init"** is a special function begin an end with double underscore in Python act as a Constructor.

(ii) Constructor function will automatically executed when an object of a class is created.

General format of __init__ method (Constructor function)

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

5. **What is the purpose of Destructor?** *[PTA-2]*

Ans. (i) Destructor is also a special method gets executed automatically when an object exit from the scope.
(ii) In Python,_del_() method is used as destructor.

General format :

```
def_del_(self):
<statements>
```

PART - III

ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. **What are class members? How do you define it?** *[PTA-1]*

Ans. 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. A class can be defined anywhere in a Python program.

Syntax for Defining a Class :

```
class class_name :
    statement_1
    statement_2
    .....
    .....
    statement_n
```

2. **Write a class with two private class variables and print the sum using a method.** *[PTA-2]*

Ans. **Code :**

```
class Sample :
    def_init_(self, n1, n2):
        self._n1=n1
        self._n2=n2
def sum(self):
    print ("Class Variable 1:",self._n1)
    print ("Class Variable 2:", self._n2)
S=Sample (5,10)
S.sum()
```

Output :

```
>>>
Class Variable 1 : 5
Class Variable 2 : 10
Sum : 15
>>>
```

3. 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

Ans. In line No.8, del F.display will not come.

4. 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()
```

Ans. Good Morning Bindu Madhavan

5. How do define constructor and destructor in Python? *[PTA-4]*

Ans. **Constructor :**

(i) Constructor is the special function that is automatically executed when an object of a class is created. In Python, there is a special function called "init" which act as a Constructor.

(ii) It must begin and end with double underscore.

(iii) Constructor function will automatically executed when an object of a class is created.

General format of constructor :

```
def__init__(self, [args .....]):
<statements>
```

Destructor :

(i) Destructor is also a special method gets executed automatically when an object exit from the scope.

(iii) In Python, __del__() method is used as destructor.

General format of constructor :

```
def__del__(self):
<statements>
```

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. Write a menu driven program to add or delete stationary items. You should use dictionary to store items and the brand.

Ans. **Code :**

```
stationary = {}
print("\n1.Add Item \n2. Delete item \n3.Exit")
ch=int(input("\nEnter your choice:"))
while(ch==1) or (ch==2):
    if(ch==1)
        n=int(input("\nEnter the Number of
        Items to be added in the Dictionary:"))
        for i in range(n):
    item=input("\nEnter an Item Name:")
    brand=input("\nEnter the Brand Name:")
    stationary[item]=brand
print(stationary)
elif(ch==2):
    ritem=input("\nEnter the item to be
            removed from the Dictionary:")
    stationary.pop(ritem)
    print(stationay)
ch=int(input("\nEnter your choice:"))
```

Output :

```
1.  Add Item
2.  Delete item
3.  Exit
Enter your choice : 1
Enter the Number of Items to be added in the
                                stationary shop : 2
Enter an Item Name : Pen
Enter the Brand Name : Rorito
Enter an Item Name : Pencil
Enter the Brand Name : Camlin
{'Pen' : 'Rorito', 'Pencil' : 'Camlin'}
Enter your choice : 2
Enter the item to be removed from the Dictionary
                                : Pen
{'Pencil': 'Camlin'}
Enter your choice : 3
```

Hands on Experience

1. Write a program using class to store name and marks of students in list and print total marks.

Ans.
```
Class stud :
    def__init__(self):
        self.name=" "
        self.m1=0
        self.m2=0
        self.tot=0
    def gdata(self):
        self.name = input("Enter your name")
        self.m1 = int(input("Enter marks 1"))
        self.m2 = int(input("Enter marks 2"))
        self.tot = self.m1 + self.m2
    def disp(self):
        print(self.name)
        print(self.m1)
        print(self.m2)
        print(self.tot)
mlist = []
st = stud()
st. gdata()
mlist.append(st)
for x in mlist :
    x. disp()
```

Output :

```
    Enter your name      Ram
    Enter marks 1        100
    Enter marks 2        100
Ram      100     100     200
```

2. Write a program using class to accept three sides of a triangle and print its area.

Ans.
```
Class Tr:
    def__init__(self, a, b, c):
        self.a = float(a)
        slef.b = float(b)
        self.c = float(c)
    def area(self):
        s = (self.a + self.b + self.c)/2
        return((s*(S.self.a)*(s.self.b)*(s.self.c)**0.5)
a = input("Enter side 1 :")
b = input("Enter side 2 :")
c = input("Enter side 3 :")
ans = Tr(a,b,c)
print(ans.area())
```

Output :

```
    Enter side 1  :      3
    Enter side 2  :      4
    Enter side 3  :      5
          6.0
```

3. Write a menu driven program to read, display, add and subtract two distances.

Ans.
```
class Dist :
    def__init__(self):
        self.dist 1=0
        self.dist 2=0
    def read(self):
        self.dist 1 =int(input("Enter distance 1"))
        sefl.dist 2 =int(input("Enter distance 2"))
    def disp(self):
        print("distance 1", self.dist 1)
        print("distance 2", self.dist 2)
    def add(self):
        print("Total distance", self.dist 1 + self.dist
                                                    2)
    def sub(self):
        print("Subtracted distance", self.dist 1-self.
        dist 2)
d=Dist()
choi = "y"
while(choi =="y"):
        print("1. accept\n2. Display \n3. Total \n4.
                                            Subtract")
ch = int(input("Enter your choice"))
if(ch==1):
    d.read()
elif(ch==2)
    d.disp()
elif(ch==3):
    d.add()
elif(ch==4):
    d.sub()
else:
    print("Invalid Input ...")
choi = input("Do you want to continue")
```

Output :

```
    1. Accept
    2. Display
    3. Add
    4. Subtract
    Enter your choice : 1
        Enter distance 1 : 100
        Enter distance 2 : 75
    Do you want to continue .. y
        1. Accept
        2. Display
        3. Add
        4. Subtract
    Enter your choice : 3
        Total distances : 175
```

```
Do you want to continue ..y
1. Accept
2. Display
3. Add
4. Subtract
Enter your choice : 2
        Enter distance 1 : 100
        Enter distance 2 : 75
Do you want to continue ..y
1. Accept
2. Display
3. Add
4. Sub
Enter your choice : 4
        Subtracted distance : 25
Do you want to continue .. N
```

PTA Questions and Answers

1 MARKS

1. In Python the class method must have which named argument as first argument? *[PTA-3]*

(a) self (b) rec
(c) global (d) key

[Ans. (a) self]

2. The function defined inside a class is called as _____. *[PTA-4]*

(a) Attribute (b) Parameter
(c) Arguments (d) Methods

[Ans. (d) Methods]

3. The symbol of project in relational algebra of DBMS : *[PTA-5]*

(a) σ (b) Π (c) ∩ (d) ∪

[Ans. (b) Π]

2 MARKS

1. Write the syntax of class instantiation. *[PTA-5]*

Ans. **Syntax :**

object_name = class_name()

Note that the class instantiation uses function notation. ie.class_name with.

2. Write the general format of slicing operation. *[PTA-6]*

Ans. **General format of slice operation:**

str[start:end]

3 MARKS

1. What is Public and Private data member in Python? *[PTA-3]*

Ans. **(i)** The variables which are defined inside the class is public by default. These variables can be accessed anywhere in the program using dot operator.

(ii) A variable prefixed with double underscore becomes private in nature. These variables can be accessed only within the class.

5 MARKS

1. Find the output of the following Python code *[PTA-1]*

```
class Sample:
    num=0
    def __init__(self, var):
            Sample.num+=1
            self.var=var
            print("The object value is = ", var)
            print("The count of object created
                                = ", Sample.num)
S1=Sample(15)
S2=Sample(35)
S3=Sample(45)
```

Ans. In the program, class variable **num** is shared by all three objects of the class Sample. It is initialized to zero and each time an object is created, the num is incremented by 1. Since, the variable shared by all objects, change made to num by one object is reflected in other objects as well.

2. What will be the output of the following Python code? *[PTA-2]*

```
class String
    def__init__(self):
            self.uppercase=0
            self.lowercase=0
            self.vowels=0
            self.consonants=0
            self.spaces=0
            self.string=""
    def getstr(self):
            self.string= "Welcome to
                                Puducherry"
    def count_upper(self):
            for ch in self.string:
                if (ch.isupper()):
                self.uppercase+=1
```

```
def count_lower(self):
        for ch in self.string:
            if (ch.islower()):
            self.lowercase+=1
def count_vowels(self):
        for ch in self.string:
            if (ch in ('A', 'a', 'e', 'E', 'i', 'I',
                                'o', 'O', 'u', 'U')):
            self.vowels+=1
def count_consonants(self):
        for ch in self.string:
            if (ch not in ('A', 'a', 'e', 'E', 'i',
                    'I', 'o', 'O', 'u', 'U', ' ')):
            self.consonants+=1
def count_space(self):
        for ch in self.string:
            if (ch==" "):
            self.spaces+=1
def execute(self):
        self.count_upper()
        self.count_lower()
        self.count_vowels()
        self.count_consonants()
        self.count_space()
def display(self):
        print("The given string
                                contains...")
        print("%d Uppercase
                    letters"%self.uppercase)
        print("%d Lowercase
                     letters"%self.lowercase)
        print(%d Vowels"%self.vowels)
        print("%d Consonants"%self.
                                consonants)
        print("%d Spaces"%self.spaces)
S = String()
S.getstr()
S.execute()
S.display()
```

Ans. **Output :**

Enter a string : Welcome to Puducherry
The given string contains
5 uppercase letters
24 lowercaase letters
12 vowels
17 consonants
3 spaces

3. **Rewrite the following Python program to get the given output:** *[PTA-3]*

OUTPUT :

```
Enter Radius: 5
The area = 78.5
The circumference = 34.10
```

CODE :

```
Class circle( )
pi=3.14
def__init__(self, radius):
        self=radius
DEF area(SELF):
        Return
        Circle.pi + (self.radius * 2)
Def circumference (self):
Return 2*circle.pi * self.radius
r = input("Enter radius= ")
c = circle(r)
print "The Area: ", c.area( )
print("The circumference=", c)
```

Ans.

```
Class circle:
    pi=3.14
def__init__(self, radius):
    self.radius = radius
def area(self):
    return circle.pi*(self.radius**2)
def circumference(self):
    return2*circle.pi*self.radius
r=int(input("Enter Radius:"))
    c = circle(r)
print("The Area= ", c.area( ))
print("The circumference = ", c.circumference)
```

Government Exam Questions and Answers

1 MARK

1. **A variable prefixed with double underscore is** *[Govt. MQP-2019]*

(a) private
(b) public
(c) protected
(d) static **[Ans. (a) private]**

3 MARKS

1. What is the output of the following program? *[Govt. MQP-2019]*

```
class Greeting:
    def__init__(self, name):
        self.__name = name
    def display(self):
        print("Good Morning", self.__name)
obj=Greeting('Tamil Nadu')
obj.display()
```

Ans. Good Morning Tamil Nadu

2. What is Constructor? *[QY-2019]*

Ans. Constructor is the special function that is automatically executed when an object of a class is created. In Python, there is a special function called "init" which act as a Constructor. It must begin and end with double underscore. This function will act as an ordinary function; but only difference is, it is executed automatically when the object is created. This constructor function can be defined with or without arguments. This method is used to initialize the class variables.

General format of __init__ method (Constructor function)

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

3. Write a Python program to check and print if the given number is odd or even using class.

Ans. *[HY-2019]*

```
class Odd_Even:
    even = 0                #class variable
def check(self, num):
    if num%2==0:
        print(num," is Even number")
else:
        print(num," is Odd number")
n=Odd_Even()
x = int(input("Enter a value: "))
n.check(x)
```

4. What is the output of the following program? *[Govt. MQP-2019]*

```
class Greeting:
    def__init__(self, name):
        self.__name = name
    def display(self):
        print("Good Morning", self.__name)
obj=Greeting('Tamil Nadu')
obj.display()
```

Ans. **Output :**

Good Morning Tamil Nadu

5 MARKS

1. How will you create the class, and objects in python. *[QY-2019]*

Ans. **(i)** In Python, a class is defi ned by using the keyword class. Every class has a unique name followed by a colon (:).

Syntax:

```
class class_name:
    statement_1
    statement_2
    ……..
    ……..
    statement_n
```

(ii) Where, statement in a class definition may be a variable declaration, decision control, loop or even a function definition. 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. A class can be defined anywhere in a Python program.

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Which of the following is not an object oriented language?

(a) C (b) C++
(c) Java (d) Python

[Ans. (a) C]

2. Which of the following called as instances of a class or class variable?

(a) Methods
(b) Objects
(c) Functions
(d) Datatypes **[Ans. (b) Objects]**

3. Functions of the class are called as

(a) Methods
(b) Members
(c) Variables
(d) Loog **[Ans. (a) Methods]**

4. In Python, every class name followed by

(a) ; (b) : (c) : : (d) .

[Ans. (b) :]

5. **Which of the following with a valid class definition?**
(a) Class classname () statement_1
(b) Class classname : : statement_1
(c) Class classname statement_1
(d) Class classname statement_1
[Ans. (c) Class classname statement_1]

6. **Which of the following is valid syntax for crating objects?**
(a) objectname = classname ()
(b) objectname : classname ()
(c) objectname = classname
(d) classname = Objectname ()
[Ans. (c) objectname = classname]

7. **Which of the operator used to accessing members of the class?**
(a) . (b) : (c) ; (d) ,
[Ans. (a) .]

8. **Which of the following can be accessed by using object with dot (.) operator?**
(a) List (b) Tuples
(c) Dictionary (d) None of these
[Ans. (d) None of these]

9. **Which of the following is valid syntax of accessing class members**
(a) objectname = classmember ()
(b) objectname . classmember ()
(c) objectname . classmember
(d) objectname . classmember
[Ans. (b) objectname . classmember ()]

10. **Write the output for the following**
```
class test
x, y = 10, 5
    s = test ()
    print (s. x + s. y)
```
(a) 10 (b) 5 (c) 15 (d) 105
[Ans. (c) 15]

11. **Which position of the argument named self in python class method?**
(a) First (b) Second
(c) Third (d) Last
[Ans. (a) First]

12. **Which argument doesn't need a value when we call the method?**
(a) this (b) self
(c) var (d) first
[Ans. (b) self]

13. **Which of the following argument values automatically by python?**
(a) self (b) this
(c) class (d) object
[Ans. (a) self]

14. **How many argument can be taken by Python method even when a method is defined with one argument?**
(a) 1 (b) 3 (c) 2 (d) 4
[Ans. (c) 2]

15. **Which of the following is automatically executed when an object of a class is created?**
(a) constructor (b) destructor
(c) class (d) members
[Ans. (a) constructor]

16. **In Python, which function will act as a constructor?**
(a) int (b) inti
(c) classname (d) init
[Ans. (d) init]

17. **In Python, constructor must begin and end with**
(a) _ _ and _ _ (b) _ _ and _ _
(c) + + and + + (d) + - and - +
[Ans. (a) _ _ and _ _]

18. **Which of the following is used to initialize the class variables?**
(a) Destructor (b) Object
(c) Constructor (d) Classmember
[Ans. (c) Constructor]

19. **Which of the following gets executed automatically when an object exit from the scope?**
(a) Destructor (b) Constructor
(c) Class (d) Object
[Ans. (a) Destructor]

20. **By default, the class variables are**
(a) Private (b) Public
(c) Protected (d) Method
[Ans. (b) Public]

21. **Which of the following is a valid private variable in python?**
(a) - i (b) i - (c) - - i (d) i - -
[Ans. (c) - - i]

22. **Which of the following variables can be accessed only within the class?**
(a) Protected (b) Public
(c) Private (d) None of these
[Ans. (d) None of these]

CHOOSE AND FILLING THE BLANKS

1. ____ and ___ are the key features of object oriented programming.
(a) List and tuples
(b) Set and dictionary
(c) Classes and objects
(d) Variables and methods
[Ans. (c) Classes and objects]

2. ____ is the main building block in python.
(a) Objects (b) Methods
(c) Constructors (d) Class
[Ans. (d) Class]

3. Class is a template for the _____
(a) Method (b) Members
(c) Object (d) Destructor
[Ans. (c) Object]

4. _____ may be a variable declaration, decision control, loop or even a function definition.
(a) Class members
(b) Class instantiation
(c) Class method
(d) Class definition **[Ans. (d) Class definition]**

5. In Python, a class is defined by using the ____ class.
(a) Operator (b) Identifier
(c) Object (d) Keyword
[Ans. (d) Keyword]

6. Class variable and methods are together known as _____ of the class.
(a) Objects (b) Functions
(c) Statements (d) Members
[Ans. (d) Members]

7. The _____ of the class should be accessed through instance of a class.
(a) Objects (b) Members
(c) Functions (d) Tuples
[Ans. (b) Members]

8. The process of creating object is called as ____
(a) Class definition (b) Class declaration
(c) Class instantiation (d) Class objects
[Ans. (c) Class instantiation]

9. When class variable declared within class, methods must be prefixed by the _____ and _____
(a) classnam, : (b) classname, .
(c) :, classname
(d) classname, objectname
[Ans. (b) classname, .]

10. Constructor must begin and with double _____
(a) Colon (b) Semicolon
(c) Dot (d) Underscore
[Ans. (d) Underscore]

11. In Python, _____ method is used as destructor.
(a) - - init - - () (b) - - des - - ()
(c) - - del - - ()
(d) - - destructor - - () **[Ans. (b) - - des - - ()]**

12. A variable prefixed with _____ become private in nature.
(a) double underscore (b) double colon
(c) double dot (d) double hyphen
[Ans. (a) double underscore]

CHOOSE THE CORRECT STATEMENT

1. (a) objectname.classmember()
(b) objectname.classmember
(c) objectname().classmember
(d) objectname : classmember
[Ans. (b) objectname.classmember]

2. Which of the following is correct declaration of constructor?
(a) - - init - -
(b) - - init - - ()
(c) - - classname - - ()
(d) - - classname - - () **[Ans. (b) - - init - - ()]**

3. (a) objectname = classname
(b) objectname : classname ()
(c) objectname = classname ()
(d) objectname : : classname ()
[Ans. (c) objectname = classname ()]

CHOOSE THE INCORRECT STATEMENT

1. (i) The process of creating object is called "Class definition"
(ii) The class members are accessed using dot (.) operator.
(iii) The first argument of the class method is not self.
(iv) The method argument defined with one argument it takes two arguments with default.
(a) i and iv (b) ii and iii
(c) iv only (d) i and iii
[Ans. (d) i and iii]

2. (i) Constructor executed automatically when the object is created

(ii) In Python, "init" which act as a destructor.

(iii) In Python, constructor can be defined only with arguments.

(iv) Construct is used to initialize the class variables.

(a) i and iii (b) ii and iv

(c) iii, iv and ii (d) ii and iii

[Ans. (d) ii and iii]

VERY SHORT ANSWERS 2 MARKS

1. Write the general form of declaring class in Python.

Ans. In Python, a class is defined by using the keyword class. Every class has a unique name followed by a colon (:).

Syntax :

```
class class_name:
statement_1
statement_2
……..
……..
statement_n
```

2. Write the syntax for the following

(i) Creating objects

(ii) Accessing class members

Ans. (i) Object – name = class_name ()

(ii) Object – name = class_member

3. Differentiate python class function and ordinary function.

Ans. Python class function or method is very similar to ordinary function with a small difference. The class method must have the first argument named as **self**.

4. Name the function which acts as a constructor and destructor.

Ans. Constructor -(- - init - - ( ))

Destructor -(- - del - - ( ))

5. Write a program in python that illustrate the use of constructor.

Ans. **Program to illustrate Constructor :**

```
class Sample:
    def __init__(self, num):
        print("Constructor of class Sample...")
        self.num=num
        print("The value is :", num)
S=Sample(10)
```

SHORT ANSWERS 3 MARKS

1. Write a note on object.

Ans. (i) Object is a collection of data and function that act on those data. Class is a template for the object.

(ii) According to the concept of Object Oriented Programming, objects are also called as instances of a class or class variable.

(iii) In Python, everything is an object. For example, all integer variables that we use in our program is an object of class int. Similarly all string variables are also object of class string.

2. Write a note on self argument used in python class function.

Ans. (i) Python class function or Method is very similar to ordinary function with a small difference that, the class method must have the first argument named as self.

(ii) No need to pass a value for this argument when we call the method. Python provides its value automatically.

(iii) Even if a method takes no arguments, it should be defined with the first argument called self.

(iv) If a method is defined to accept only one argument it will take it as two arguments ie. self and the defined argument.

3. Write a python program to find total and average marks using class.

Ans.

```
class Student:
    mark1, mark2, mark3 = 45, 91, 71
                                #class variable
    def process(self):          #class method
        sum = Student.mark1 + Student.mark2 +
                                Student.mark3
        avg = sum/3
        print("Total Marks = ", sum)
        print("Average Marks = ", avg)
        return
S=Student()
S.process()
```

4. **Explain the working of the following program.**

```
class Sample:
    def __init__(self, num):
        print("Constructor of class Sample...")
        self.num=num
        print("The value is :", num)
S=Sample(10)
```

Ans. **(i)** The above class "Sample", has only a constructor with one argument named as num. When the constructor gets executed, first the print statement, prints the "Constructor of class Sample….", then, the passing value to the constructor is assigned to self.num and finally it prints the value passed along with the given string.

(ii) The above constructor gets executed automatically, when an object S is created with actual parameter 10. Thus, the Python displays the following output.

(iii) Constructor of class Sample...
The value is : 10
Class variable defined within constructor keep count of number of objects created with the class.

5. **Fill up the blanks in the following program to get the output :**

Value of x = 10
Value of y = 20
Sum of x and y = 30

```
Class sample:
    x, ____ = 10, 20 ----------①
    s = _____ ----------②
print ("value of x =", _____) ----------③
print ("value of y =", _____) ----------④
print ("sum of x and y =", _____) --------⑤
```

Ans. **1.** – y
2. – sample ()
3. – s. x
4. – s. y
5. – s. x + s. y

6. **Read the following program. Answer the following question.**

```
Class sample:
x, y = 10, 20
s = sample ()
print (s. x + s. y)
```

1. **What does sample denotes?**
2. **What does x, y denotes?**
3. **What does s denotes?**

Ans. **1.** It denotes class name
2. x, y is a class variables of the class
3. S is an object created to access the members of the class

LONG ANSWERS — 5 MARKS

1. **Write a program to check and print if the given number is negative or positive using class.**

Ans.

```
class test:
def check (self, num)
    if num> 0:
        print (num, "is positive number")
else:
        print (num, "is negative number")
    n = test ()
    x = int (input("Enter the number"))
    n. check (x)
```

2. **Write a menu driven program that keeps record of books available in you school library.**

Ans.

```
class Library:
def __init__(self):
        self.bookname=""
        self.author=""
def getdata(self):
        self.bookname = input("Enter Name of the Book: ")
        self.author = input("Enter Author of the Book: ")
def display(self):
    print("Name of the Book: ",self.bookname)
    print("Author of the Book: ",self.author)
    print("\n")
book=[] #empty list
ch = 'y'
while(ch=='y'):
    print("1. Add New Book \n 2.Display Books")
    resp = int(input("Enter your choice : "))
if(resp==1):
    L=Library()
    L.getdata()
    book.append(L)
elif(resp==2):
    for x in book:
        x.display()
else:
    print("Invalid input....")
ch = input("Do you want continue....")
```

3. Write a program to store product and its cost price. Display all the available products and prompt to enter quantity of all the products. Finally generate a bill which displays the total amount to be paid.

Ans.

```
class MyStore:
    __prod_code=[]
    __prod_name=[]
    __cost_price=[]
    __prod_quant=[]
def getdata(self):
    self.p = int(input("Enter no. of products you need to store: "))
    for x in range(self.p):
    self.__prod_code.
    append(int(input("Enter Product Code: ")))
    self.__prod_name.append(str(input("Enter Product Name: ")))
    self.__cost_price.append(int(input("Enter Cost price: ")))
def display(self):
    print("Stock in Stores")
    print("-------------------------------------")
    print("Product Code \t Product Name \t Cost Price")
    print("-------------------------------------")
    for x in range(self.p):
    print(self.__prod_code[x], "\t\t", self.__prod_name[x], "\t\t", self.__cost_price[x])
    print("-------------------------------------")
def print_bill(self):
    total_price = 0
    for x in range(self.p):
        q=int(input("Enter the quantify for the product code %d : "%self.__prod_code[x]))
self.__prod_quant.append(q)
total_price = total_price +self.__cost_price[x]*self.__prod_quant[x]
    print(" Invoice Receipt ")
    print("-------------------------------------")
    print("Product Code\t Product Name\t Cost Price\t Quantity \t Total Amount")
    print("-------------------------------------")
for x in range(self.p):
    print(self.__prod_code[x], "\t\t", self.__prod_name[x], "\t\t",
        self.__cost_price[x], "\t\t", self.__prod_quant[x], "\t\t",
        self.__prod_quant[x]*self.__cost_price[x])
    print("-------------------------------------")
    print(" Total Amount = ", total_price)
```

☆☆☆

UNIT-IV DATABASE CONCEPTS AND MYSQL

CHAPTER 11

DATABASE CONCEPTS

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. **What is the acronym of DBMS?**
(a) DataBase Management Symbol
(b) Database Managing System
(c) DataBase Management System
(d) DataBasic Management System
[Ans. (c) DataBase Management System]

2. **A table is known as**
(a) tuple (b) attribute
(c) relation (d) entity
[Ans. (c) relation]

3. **Which database model represents parent-child relationship?**
(a) Relational (b) Network
(c) Hierarchical (d) Object
[Ans. (c) Hierarchical]

4. **Relational database model was first proposed by** *[HY-2019]*
(a) E F Codd (b) E E Codd
(c) E F Cadd (d) E F Codder
[Ans. (a) E F Codd]

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
[Ans. (b) one-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
[Ans. (c) Edgar Frank Codd]

7. **Which of the following is an RDBMS?**
(a) Dbase (b) Foxpro
(c) Microsoft Access (d) SQLite
[Ans. (d) SQLite]

8. **What symbol is used for SELECT statement?** *[PTA-2]*
(a) σ (b) Π (c) X (d) Ω
[Ans. (a) σ]

9. **A tuple is also known as** *[PTA-6]*
(a) table (b) row
(c) attribute (d) field
[Ans. (b) row]

10. **Who developed ER model?**
(a) Chen (b) EF Codd
(c) Chend (d) Chand
[Ans. (a) Chen]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. **Mention few examples of a database.**
Ans. **(i)** Foxpro
(ii) DBase
(iii) ADABAS
(iv) Microsoft Excel
(v) Microsoft Square
(vi) Oracle RDBMS
(vii) My SQL

2. **List some examples of RDBMS.**
Ans. **(i)** IBM DBZ
(ii) Maria DB
(iii) Microsoft Jet Database Engine
(iv) My SQL
(v) Oracle
(vi) SQLite

3. **What is data consistency?**
Ans. Data Consistency means that data values are the same at all instances of a database

4. **What is the difference between Hierarchical and Network data model?**
Ans.

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.
It represents one-to-one relationship called parent-child relationship in the form of tree structure.	It represents the data in many-to-many relationships.

5. What is normalization?

Ans. Database normalization is the process of structuring a relational database in accordance with a series of so-called normal forms in order to reduce data redundancy and improve data integrity.

PART - III
ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. What is the difference between Select and Project command? *[PTA-2; QY-2019]*

Ans.

Select	Project
The SELECT operation is used for selecting a subset with tuples according to a given condition C.	The projection method defines a relation that contains a vertical subset a relation.
Select filters out all tuples that do not satisfy C.	The projection eliminates all attributes of the input relation but those mentioned in the projection list.
Symbol : σ	Symbol : π

2. What is the role of DBA?

Ans. 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.

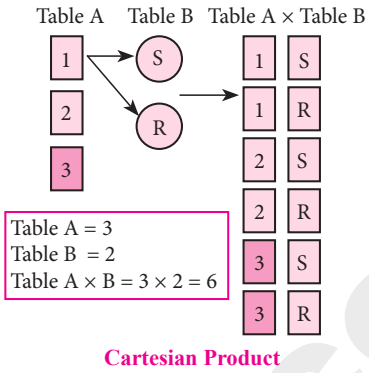
3. Explain Cartesian Product with a suitable example. *[Govt. MQP-2019; PTA-5]*

Ans.

(i) Cross product is a way of combining two relations. The resulting relation contains, both relations being combined.

(ii) A × B means A times B, where the relation A and B have different attributes.

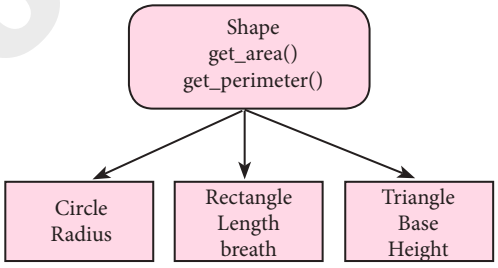
(iii) This type of operation is helpful to merge columns from two relations.



Cartesian Product

4. Explain Object Model with example. *[QY-2019]*

Ans. **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.



Object Model

An example of the Object model is **Shape, Circle, Rectangle** and **Triangle** are all objects in this model.

(i) **Circle** has the attribute **radius**.

(ii) Rectangle has the attributes length and breadth.

(iii) Triangle has the attributes base and height.

(iv) The objects Circle, Rectangle and Triangle inherit from the object Shape.

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

Ans. **Types of DBMS Users**

(i) **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.

(ii) **Application Programmers or Software Developers :** This user group is involved in developing and designing the parts of DBMS.

(iii) **End User :** End users are the one who store, retrieve, update and delete data.

(iv) **Database designers :** They are responsible for identifying the data to be stored in the database for choosing appropriate structures to represent and store the data.

PART - IV

ANSWER THE FOLLOWING QUESTIONS

(5 MARKS)

1. Explain the different types of data model.

[HY-2019]

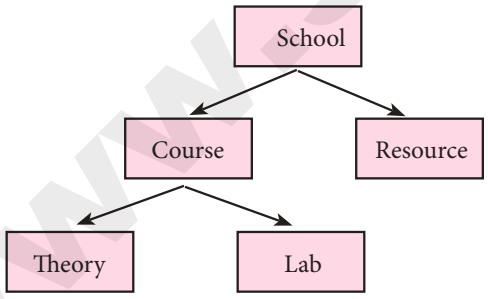
Ans. **The different types of a Data Model:** Hierarchical Model, Relational Model, Network Database Model, Entity Relationship Model, Object Model.

Hierarchical Model :

(i) Hierarchical model was developed by IBM as Information Management System. In Hierarchical model, data is represented as a simple tree like structure form.

(ii) This model represents a one-to-many relationship i.e., parent-child relationship. One child can have only one parent but one parent can have many children.

(iii) This model is mainly used in IBM Main Frame computers.



Hierarchical Model

Relational Model :

(i) 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.

(ii) 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.

(iii) 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)).

Stu_id	Name	Age
1	Malar	17
2	Suncar	16
3	Velu	16

Subj_id	Name	Teacher
1	C++	Kannan
2	Php	Ramakrishnan
3	Python	Vidhya

Stu_id	Subj_id	Marks
1	1	92
1	2	89
3	2	96

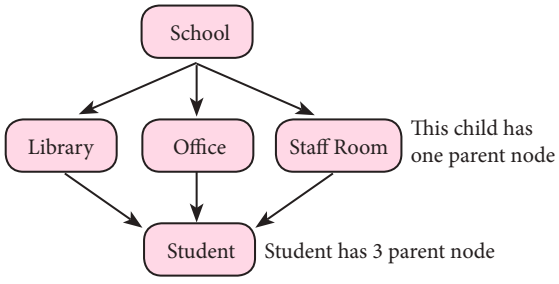
Relational Model

Network Model : Network database model is an extended form of hierarchical data model. The difference between hierarchical and Network data model is :

(i) In hierarchical model, a child record has only one parent node,

(ii) In a Network model, a child may have many parent nodes. It represents the data in many-to-many relationships.

(iii) This model is easier and faster to access the data.



Network Model

(iv) School represents the parent node

(v) Library, Office and Staff room is a child to school (parent node)

(vi) Student is a child to library, office and staff room (one to many relationship)

Entity Relationship Model. (ER model) :

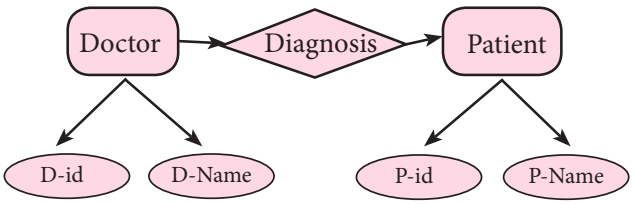
(i) In this database model, relationship are created by dividing the object into entity and its characteristics into attributes.

(ii) 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.

(iii) Rectangle represents the entities. E.g. Doctor and Patient.

(iv) Ellipse represents the attributes E.g. D-id, D-name, P-id, P-name. Attributes describes the characteristics and each entity becomes a major part of the data stored in the database. Diamond represents the relationship in ER diagrams

E.g. Doctor diagnosis the Patient



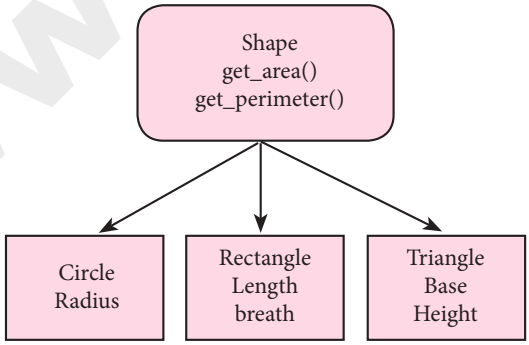
ER model

Object Model :

(i) Object model stores the data in the form of objects, attributes and methods, classes and Inheritance.

(ii) This model handles more complex applications, such as Geographic information System (GIS), scientific experiments, engineering design and manufacturing.

(iii) 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.



Object Model

2. Explain the different types of relationship mapping. *[PTA-1, 4]*

Ans. The types of relationships used in a database.

(i) One-to-One Relationship

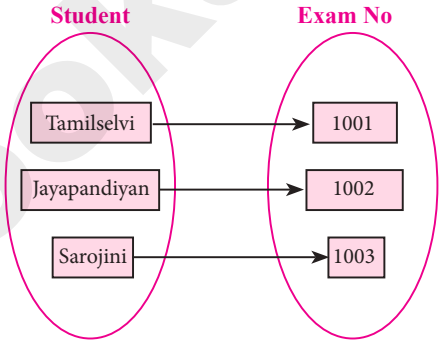
(ii) One-to-Many Relationship

(iii) Many-to-One Relationship

(iv) Many-to-Many Relationship

(i) **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.

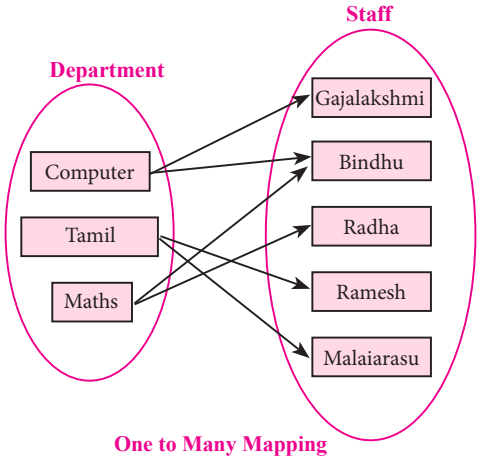
For example : A student can have only one exam number



One to one Relationships

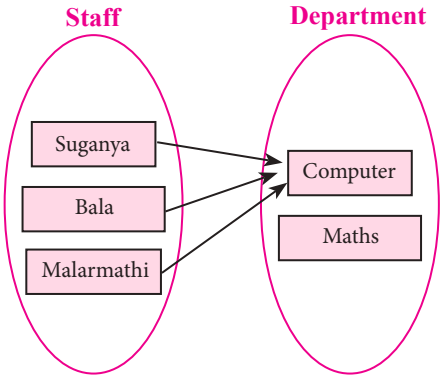
(ii) **One-to-Many Relationship :** In One-to-Many relationship, one entity is related to many other entities. One row in a table A is linked to many rows in a table B, but one row in a table B is linked to only one row in table A.

For example: One Department has many staff members.



One to Many Mapping

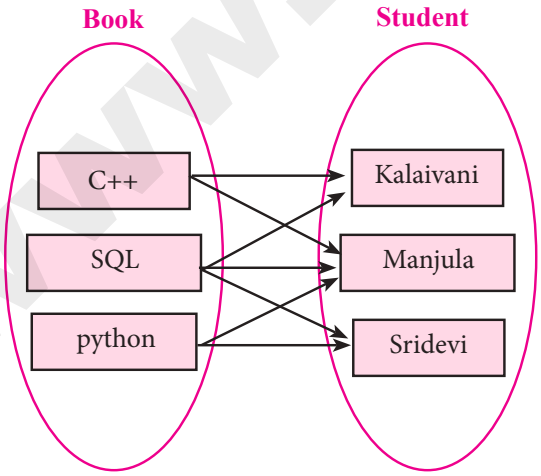
(iii) **Many-to-One Relationship :** In Many-to-One Relationship, many entities can be related with only one in the other entity.
For example: A number of staff members working in one Department. Multiple rows in staff members table is related with only one row in Department table.



Many to one Relationship

(iv) **Many-to-Many Relationship :** A many-to-many relationship occurs when multiple records in a table are associated with multiple records in another table.

- **Example 1 : Customers and Product**
  Customers can purchase various products and Products can be purchased by many customers
- **Example 2 : Students and Courses**
  A student can register for many Courses and a Course may include many students
- **Example 3 : Books and Student.**
  Many Books in a Library are issued to many students.



Many to Many Relationship

3. Differentiate DBMS and RDBMS.

Ans.

Basis of Comparison	DBMS	RDBMS
Expansion	Database Management System	Relational DataBase Management System
Data storage	Navigational model ie data by linked records	Relational model (in tables). ie data in tables as row and column
Data redundancy	Exhibit	Not Present
Normalization	Not performed	RDBMS uses normalization to reduce redundancy
Data access	Consumes more time	Faster, compared to DBMS.
Keys and indexes	Does not use.	used to establish relationship. Keys are used in RDBMS.
Transaction management	Inefficient, Error prone and insecure.	Efficient and secure.
Distributed Databases	Not supported	Supported by RDBMS.
Example	Dbase, FoxPro.	SQL server, Oracle, mysql, MariaDB, SQLite.

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

Ans. Relational Algebra is divided into various groups

Unary Relational Operations :

- SELECT (symbol : σ)
- PROJECT (symbol : Π)

Relational Algebra Operations from Set Theory :

- UNION (∪)
- INTERSECTION (∩)
- DIFFERENCE (–)
- CARTESIAN PRODUCT (X)

SELECT (symbol : σ) :

(i) General form σ_c (R) with a relation R and a condition C on the attributes of R.

(ii) The SELECT operation is used for selecting a subset with tuples according to a given condition.

(iii) Select filters out all tuples that do not satisfy C.

STUDENT :

Stu dio	Name	Course	Year
cs1	Kannan	Big Data	II
cs2	Gowri Shankar	R language	I
cs3	Lenin	Big Data	I
cs4	Padmaja	Python Programming	I

Table A

σ_{course} = "Big Data" (STUDENT) :

PROJECT (symbol : Π) :

(i) The projection eliminates all attributes of the input relation but those mentioned in the projection list.

(ii) The projection method defines a relation that contains a vertical subset of Relation.

(iii) **Example 1 using Table A**

Π_{course} (STUDENT)

Result :

Course
Big Data
R language
Python Programming

UNION (Symbol : ∪) :

(i) 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

(ii) **Example 3**

Consider the following tables

Table A	
Studio	**Name**
cs1	Kannan
cs2	Lenin
cs3	Padmaja

Table B	
Studio	**Name**
cs1	Kannan
cs2	GowriShakaran
cs3	Lenin

Result :

Table A ∪ B	
Studio	**Name**
cs1	Kannan
cs2	GowriShankaran
cs3	Lenin
cs4	Padmaja

SET DIFFERENCE (Symbol : -) :

(i) The result of A – B, is a relation which includes all tuples that are in A but not in B.

(ii) The attribute name of A has to match with the attribute name in B.

(iii) **Example 4 (using Table B) :**

Result :

Table A – B	
cs4	Padmaja

INTERSECTION (symbol : ∩) A ∩ B :

(i) 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.

(ii) **Example 5 (using Table B)**

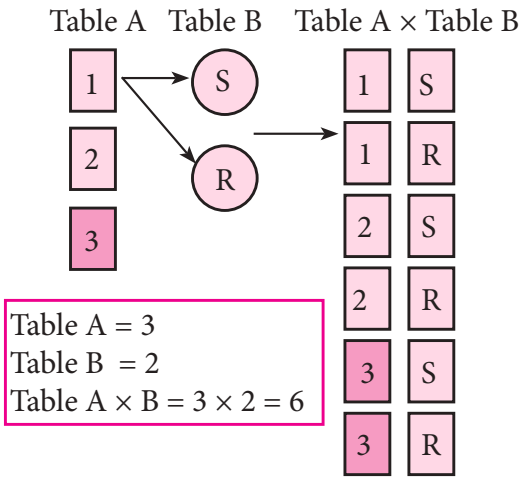
Table A ∩B	
cs1	Kannan
cs3	Lenin

PRODUCT OR CARTESIAN PRODUCT (Symbol : X)

(i) Cross product is a way of combining two relations. The resulting relation contains, both relations being combined.

(ii) A × B means A times B, where the relation A and B have different attributes.

(iii) This type of operation is helpful to merge columns from two relations.



Cartesian Product

5. Explain the characteristics of DBMS. *[PTA-3, 5]*

Ans. **Characteristics of Database Management System**

Data stored into Tables	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.
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.
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.
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.
Query Language	DBMS provides users with a simple query language, using which data can be easily fetched, inserted, deleted and updated in a database.
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.
DBMS Supports Transactions	It allows us to better handle and manage data integrity in real world applications where multi-threading is extensively used.

PTA Questions and Answers

1 MARK

1. A column in database table is known as an : *[PTA-1]*

(a) Atribute (b) Relation (c) Tuple (d) Data

[Ans. (b) Relation]

2. Which is the entire collection of related data in one table? *[PTA-3]*

(a) tuple (b) atribute (c) table (d) software

[Ans. (c) table]

3. What type of relationship does hierarchical model represents? *[PTA-4]*

(a) one-to-one (b) one-to-many
(c) many-to-one (d) many-to-many

[Ans. (b) one-to-many]

2 MARKS

1. What are the shapes to represent database structure in ER model?

(or)

Describe the database structure. *[PTA-2, 6]*

Ans. **(i)** Table is the entire collection of related data in one table, referred to as a File or Table where the data is organized as row and column.

(ii) Each row in a table represents a record, which is a set of data for each database entry.

(iii) Each table column represents a Field, which groups each piece or item of data among the records into specific categories or types of data. Eg. StuNo., StuName, StuAge, StuClass, StuSec.

- A Table is known as a RELATION
- A Row is known as a TUPLE
- A column is known as an ATTRIBUTE

2. What are the advantages of DBMS. *[PTA-3]*

Ans. **Advantages of DBMS :**

(i) Segregation of application program

(ii) Minimal data duplication or Data Redundancy

(iii) Easy retrieval of data using the Query Language

(iv) Reduced development time and maintenance

3 MARKS

1. Writea short note on Unary Relational Operations of DBMS. *[PTA-4]*

Ans. A unary operator is an operator that operates on only one operant. An operator is referred to as binary if it operates on two operands.

Unary Relational Operations

SELECT (Symbol : σ)

PROJECT (Symbol : π)

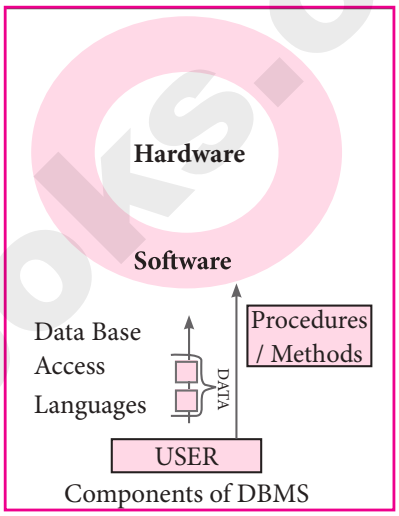
5 MARKS

1. Explain the components of DBMS.

[Govt. MQP-2019; PTA-6]

Ans. The Database Management System can be divided into five major components as follows:

(i) Hardware
(ii) Software
(iii) Data
(iv) Procedures / Methods
(v) Database Access Languages



Components of DBMS

(i) Hardware : The computer, hard disk, I/O channels for data, and any other physical component involved in storage of data

(ii) Software : This main component is a program that controls everything. The DBMS software is capable of understanding the Database Access Languages and interprets into database commands for execution.

(iii) Data : It is that resource for which DBMS is designed. DBMS creation is to store and utilize data.

(iv) Procedures/Methods : They are general instructions to use a database management system such as installation of DBMS, manage databases to take backups, report generation, etc.

(v) DataBase Access Languages : They are the languages used to write commands to access, insert, update and delete data stored in any database.

Examples of popular DBMS : Dbase, FoxPro

Government Exam Questions and Answers

1 MARK

1. The data model developed by IBM is *[Govt. MQP-2019]*

(a) Hierarchical (b) Relational
(c) Network (d) ER

[Ans. (a) Hierarchical]

2. Which model database created by dividing the object into entity and its Characteristics into attributes? *[QY-2019]*

(a) Hierarchical (b) Relational
(c) Network (d) ER data base

[Ans. (a) Edata base]

2 MARKS

1. List the types of database Model. *[QY-2019]*

Ans. The different types of a Data Model

(i) Hierarchical Model
(ii) Relational Model
(iii) Network Database Model
(iv) Entity Relationship Model
(v) Object Model

Additional Questions and Answers

Choose the Correct Answer 1 MARK

1. Which of the following is an organized collection of data?

(a) Word Processor (b) Spreadsheet
(c) Programming language
(d) Database **[Ans. (d) Database]**

2. Which of the following is an organized collection of data, which can be stared and a cersed through computer system

(a) Database (b) Worksheet
(c) DBMS (d) Information

[Ans. (a) Database]

3. Which of the following a data contain?

(a) Character (b) text
(c) Word (d) Number
(e) All of these **[Ans. (c) Word]**

4. In which of the following data organized in a way that, it can be easily accessed, managed and updated?

(a) Database (b) DBMS
(c) Structure (d) Object

[Ans. (a) Database]

5. Which of the following can be a software or hardware based, with one sole purpose of storiing data?

(a) DBMS (b) Database
(c) Object (d) SQL

[Ans. (b) Database]

6. Expand DBMS

(a) Database memory system
(b) Digital Based Management source
(c) Database Management system
(d) Digital Database Management system

[Ans. (c) Database Management system]

7. Which of the following allows users to store, process and analyze data easily?

(a) My SQL
(b) Relational Algebra
(c) Datamodels
(d) DBMS **[Ans. (d) DBMS]**

8. Which of the following provided an interface to perform various operations to create a database, storing and updating data?

(a) SQL (b) DBA
(c) DBMS (d) Algebra

[Ans. (c) DBMS]

9. Which of the following provides protection and security to the databases?

(a) My SQL (b) DBMS
(c) Oracel (d) CSV

[Ans. (b) DBMS]

10. Which of the following is not an example of DBMS?

(a) Foxpro (b) Dbase
(c) CoBoL (d) Ms-Access

[Ans. (c) CoBoL]

11. Which of the following makes the data more meaningful and connected in the database?
(a) Information (b) Security
(c) Relationship (d) Data models
[Ans. (c) Relationship]

12. Which of the following divides the data in such a way that repetition of data is minimum in the database?
(a) Segregation (b) Normalisation
(c) Integrity (d) Consistency
[Ans. (b) Normalisation]

13. Which of the following characteristics of DBMS become a challenge?
(a) Data redundancy (b) Data security
(c) Data consistency (d) Data integrity
[Ans. (c) Data consistency]

14. How many major components are there in DBMS?
(a) 5 (b) 4 (c) 3 (d) 2
[Ans. (a) 5]

15. Which of the following is not a DBMS component?
(a) Hardware/Square (b) Data
(c) Procedures (d) Data model
[Ans. (d) Data model]

16. Which of the following DBMS components controls everything in a database?
(a) Hardware (b) Square
(c) Methods (d) Procedures
[Ans. (b) Square]

17. Which of the following DBMS components that manage databases to take backups, report generation?
(a) Square (b) Hardware
(c) Data (d) Procedures
[Ans. (d) Procedures]

18. Which of the following used to write commands to update and delete data stored in database?
(a) Procedures (b) Methods
(c) Database Access language
(d) Hardware/software
[Ans. (c) Database Access language]

19. Each row in a table represents a
(a) Fields (b) Record
(c) Data (d) File
[Ans. (b) Record]

20. Which of the following in a table represents a record?
(a) Row (b) Column
(c) File (d) Data
[Ans. (a) Row]

21. Which of the following in a table represents a column?
(a) row (b) column
(c) data (d) files
[Ans. (b) column]

22. Which of the following groups data among records specific categories or types of data?
(a) Table (b) file
(c) Field (d) Relation
[Ans. (c) Field]

23. How the data can be represented and accessed from a software after complete implementation described by
(a) Data model
(b) Data implementation
(c) Data redundancy (d) Data integrity
[Ans. (a) Data model]

24. Which of the following is a simple abstraction of complex real world data gathering environment?
(a) Data redundancy (b) Data consistency
(c) Data abstraction (d) Data model
[Ans. (d) Data model]

25. How many types of data models are there?
(a) 4 (b) 3 (c) 5 (d) 7
[Ans. (c) 5]

26. Which of the following is not a type of data model?
(a) Hierarchical model
(b) Entity Relationship model
(c) Object model
(d) Redundancey model
[Ans. (d) Redundancey model]

27. Which of the following model was developed by IBM?
(a) ER model
(b) Hierarchical model
(c) Network database model
(d) Object model
[Ans. (b) Hierarchical model]

28. IBM developed Hierarchical model as
(a) Data Management system
(b) Information Hierarchical system
(c) Information Management system
(d) Information model system
[Ans. (c) Information Management system]

29. In which data model, data is represented as a simple tree like structure form?
(a) Hierarchical model
(b) Network database (c) ER model
(d) Relational model
[Ans. (a) Hierarchical model]

30. Which of the following data model is mainly used in IBM main frame computers?
(a) ER model (b) Hierarchical
(c) Object (d) Relational
[Ans. (b) Hierarchical]

31. In which year Relational Database model was first purposed?
(a) 1960 (b) 1964
(c) 1974 (d) 1970
[Ans. (d) 1970]

32. The basic structure of data in relational model is
(a) Tables (b) rows
(c) columns (d) tuples
[Ans. (a) Tables]

33. Which of the following is the most data model used for data base appreciation?
(a) ER-Model (b) Hierarchical
(c) Relational (d) table
[Ans. (c) Relational]

34. Which of the following data base model is an extended form of hierarchical data model?
(a) ER-model (b) Network
(c) Object (d) Relational
[Ans. (b) Network]

35. Network database model represents the data in which of the relationships?
(a) one to one (b) one to many
(c) many to many (d) many to one
[Ans. (c) many to many]

36. Which data model is easier and faster in accessing the data?
(a) Relational (b) Network
(c) ER-mode (d) all the above
[Ans. (b) Network]

37. ER-model was developed in the year
(a) 1970 (b) 1974
(c) 1976 (d) 1978
[Ans. (c) 1976]

38. Which of the following database model is useful in developing a conceptual design for the database?
(a) Hierarchical (b) Object
(c) Relational (d) ER model
[Ans. (d) ER model]

39. Which database model is simple and easy to design logical view of data?
(a) Hierarchical (b) ER-model
(c) Network (d) Object
[Ans. (b) ER-model]

40. Which of the following data model stores the data in the form of attributes and methods?
(a) Relational (b) Object
(c) ER - model (d) All of these
[Ans. (d) All of these]

41. Object model stores the data in the form of
(a) objects
(b) attributes and methods
(c) classes and inheritance
(d) all of these [Ans. (d) all of these]

42. GIS expansion is
(a) Geographic Information System
(b) Global Information System
(c) Global Information Source
(d) Geographic Intelligent System
[Ans. (a) Geographic Information System]

43. Which of the following data model handles Geographic Information System?
(a) Object (b) ER model
(c) Relational (d) None of these
[Ans. (a) Object]

44. Which data model used in file management system?
(a) ER model (b) Relational
(c) Hierarchical (d) None of these
[Ans. (d) None of these]

45. How many types of DBMS users are there?
(a) 2 (b) 3 (c) 4 (d) 5
[Ans. (c) 4]

46. DBA expansion is
(a) Data Base Analyst
(b) Data Base Administrators
(c) Digital Bound Administrations
(d) Database Analyser
[Ans. (b) Data Base Administrators]

47. Who takes care of the security of DBMS?
(a) DBA (b) end user
(c) Software developer (d) DB designer
[Ans. (a) DBA]

48. Who manages the complete database management system?
(a) End user (b) DBA
(c) DB designer
(d) Software developer [Ans. (b) DBA]

49. Who are the one responsible for identifying the data to be stored in the data base?
(a) DBA
(b) Application programmers
(c) End user
(d) Database designers
[Ans. (d) Database designers]

50. RDBMS expansion is
(a) Redundancy Database Management System
(b) Reliable Database Management System
(c) Relational Database Management System
(d) Relational Database Mobile System
[Ans. (c) Relational Database Management System]

51. Which of the following is not a RDBMS software?
(a) Oracle (b) My SQL
(c) Maria DB (d) Foxpro
[Ans. (d) Foxpro]

52. Find the odd man out
(a) SQLite (b) Maria DB
(c) Oracle (d) Dbase
[Ans. (d) Dbase]

53. Find the odd man out
(a) ER mode (b) data model
(c) Hierarchical model (d) Relational model
[Ans. (b) data model]

54. Database normalization was first proposed by
(a) Chen (b) Edgar F Cadd
(c) Edgar IF Codd (d) Hugh Darwen
[Ans. (c) Edgar IF Codd]

55. The rule "reduce data redundancy and improve data integrity" is known as
(a) Chen rule (b) E F Codd rule
(c) Edgar rule (d) Edgar Frank rule
[Ans. (b) E F Codd rule]

56. How many types of relationships used in a database?
(a) 3 (b) 5 (c) 2 (d) 4
[Ans. (d) 4]

57. One classroom has many students is an example of a relationships
(a) one to one (b) one to many
(c) many to one (d) many to many
[Ans. (b) one to many]

58. Which of the following was used for modeling the data stored in relational databases?
(a) ER model (b) Modern algebra
(c) Relational Algebra (d) Object model
[Ans. (c) Relational Algebra]

59. Relational Algebra is used to query the database tables using
(a) Dbase (b) SQL
(c) ER-Model (d) Relational model
[Ans. (b) SQL]

60. Expansion of SQL is
(a) Structured Question Language
(b) Selection Query Language
(c) Structured Query Language
(d) Structured Query Language
[Ans. (d) Structured Query Language]

61. Which of the following represents Unary relational operations SELECT
(a) π (b) σ (c) X (d) ∩
[Ans. (b) σ]

62. The symbol represents Unary relation operation PROJECT is
(a) ∩ (b) ∪ (c) σ (d) π
[Ans. (d) π]

63. Find the odd man out
(a) – (b) X (c) + (d) ∩
[Ans. (c) +]

64. Which operation is used for selecting a subset with tuples according to a given condition?
(a) select (b) project
(c) product (d) union
[Ans. (a) select]

65. Which of the following defines a relation that contains a vertical subset of relation?
(a) select (b) product
(c) intersection (d) project
[Ans. (d) project]

66. Which of the following removes the duplicate rows in database?
(a) SELECT (b) PROJECT
(c) PRODUCT (d) INTERSECTION
[Ans. (b) PROJECT]

67. Which of the following includes all types that are in tables A or in B?
(a) A ∪ B (b) A – B
(c) A × B (d) A ∩ B
[Ans. (a) A ∪ B]

68. Which defines a relation consisting of a set of all tuple that are in both in A and B?
(a) A ∪ B (b) A – B
(c) A × B (d) A ∩ B
[Ans. (d) A ∩ B]

MATCH THE FOLLOWING

1.

i)	Hardware	1)	It is a resource for which DBMS is designed
ii)	Square	2)	Used to write commands
iii)	Data	3)	Physical components involved in data storage
iv)	Proceduresa	4)	Manage databases to take backups.
v)	Database Access language	5)	A program that controls everything

(a) 3, 5, 1, 4, 2 (b) 5, 3, 1, 4, 2
(c) 3, 5, 4, 1, 2 (d) 3, 5, 1, 2, 4
[Ans. (a) 3, 5, 1, 4, 2]

CHOOSE AND FILL IN THE BLANKS

1. The term _____ is used to refer to any of the DBMS
(a) Object (b) Database
(c) Data model (d) Data mining
[Ans. (b) Database]

2. _____ is formatted data
(a) Raw facts (b) Database
(c) Information (d) DBMS
[Ans. (c) Information]

3. When the data is processed It gives a meaningful _____
(a) Database (b) Information
(c) Facts (d) Entities
[Ans. (b) Information]

4. _____ is a repository collection of related data
(a) SQL (b) Information
(c) Entities (d) Database
[Ans. (d) Database]

5. A _____ is a software used to create, store and manipulate database
(a) Relational Algebra (b) DBMS
(c) SQL (d) My SQL
[Ans. (b) DBMS]

6. In database, the data stored in _____
(a) Tables (b) Sets
(c) Lists (d) DBMS
[Ans. (a) Tables]

7. In _____ where the data is organized as row and column
(a) Database (b) DBMS
(c) File or table
(d) Procedure or methods
[Ans. (c) File or table]

8. Hierarchical model represents a _____ relationship.
(a) one to one (b) many to one
(c) are to many (d) many to many
[Ans. (c) are to many]

9. A table row is known as_____
(a) Relation (b) Attribute
(c) field (d) tuple
[Ans. (d) tuple]

10. A table column is known as_____
(a) Relation (b) Attribute
(c) Tuple (d) record
[Ans. (b) Attribute]

11. _____ are also known as relations in a relational model
(a) Table rows (b) Tables
(c) Table columns (d) Tuples
[Ans. (b) Tables]

12. All the information is related to a particular type is stored in _____ of that table
(a) Columns (b) fields
(c) rows (d) file
[Ans. (c) rows]

13. A relation key is a key which uniquely identifies a particular _____
(a) columns (b) fields
(c) tuples (d) none of these
[Ans. (c) tuples]

14. A _____ is an attribute which uniquely identifies a particular tuple
(a) relation key (b) row key
(c) data key (d) tuple key
[Ans. (a) relation key]

15. Each column in a table represents a_____
(a) Record (b) Data
(c) Field (d) Method
[Ans. (c) Field]

16. _____ database model is an extended form of hierarchical data model
(a) object (b) Relational
(c) ER model (d) Network
[Ans. (d) Network]

17. _____ data model provides a clear modular structure of a data
(a) Object (b) Relational
(c) Hierarchical/ER-model
(d) All of these [Ans. (a) Object]

18. Doctor and Patient is an example of _____ database model
(a) ER-model (b) Relation
(c) Object (d) Hierarchical
[Ans. (a) ER-model]

19. In _____ data model, the data stores in the form of classes and inheritance.
(a) Hierarchical
(b) Entity relationship
(c) Object (d) Network
[Ans. (c) Object]

20. The result of _____ is a relation which includes all tuples that are in A but not in B.
(a) $A \cap B$ (b) $A \cup B$
(c) $A - B$ (d) $A \times B$
[Ans. (c) A – B]

21. _____ is a computer based record keeping system
(a) Data model
(b) Data relationships
(c) DBMS
(d) Entity relationship [Ans. (c) DBMS]

22. A way of combining two relations is_____
(a) $A \cup B$ (b) $A \times B$
(c) $A \cap B$ (d) $A \sigma B$
[Ans. (b) A × B]

23. **Relational Algebra was first created by_____**

(a) E F Codd (b) Chen

(c) Chris Date (d) Hugh Darwen

[Ans. (a) E F Codd]

24. **_____ are the one who store, retrieve, update and delete data**

(a) DBA

(b) Database designers

(c) Application developers

(d) End user **[Ans. (d) End user]**

Choose the correct pair

1. (a) Table row = tuple

(b) Table column = Relation

(c) Table = Attribute

(d) Table = record

[Ans. (a) Table row = Tuple]

2. (a) Select - ∩

(b) Product - σ

(c) Project - π

(d) Intersection - ∪ **[Ans. (c) Project - π]**

Choose the incorrect pair

1. (a) Product - ∪

(b) Select - σ

(c) Project - π

(d) Intersection - ∩ **[Ans. (a) Product - ∪]**

2. (a) Table = file

(b) Table = Data

(c) Table = Relation

(d) Table row = tuple

[Ans. (b) Table = Data]

Choose the correct statement

1. (a) In 1970, Chen developed the ER-model

(b) Object model does not store the data in the form of classes and inheritance.

(c) In 1976, EF Codd proposed Relational database model

(d) Data model is a simple abstraction of complex real world data gathering environment.

[Ans. (d) Data model is a simple abstraction of complex real world data gathering environment]

2. (a) Using ER model, it is easy to design logical view of data

(b) Object model handles more complex applications.

(c) ER model is useful in developing a conceptual design of a database

(d) All the above **[Ans. (d) All the above]**

Choose the incorrect statement

1. (i) DBMS maintains data consistency

(ii) DBMS does not provides protection and security to the database

(iii) DBMS provides an interface to perform creation, storing and updating data in the database.

(iv) DBMS can be a square or hardware based with one sole purpose of storing data

(a) i and ii (b) only ii

(c) iii and iv (d) ii and iv

[Ans. (d) ii and iv]

2. (a) IBM developed Hierarchical data model

(b) EF Codd proposed the Relational database model

(c) Network model represents the data in many-to one relationships

(d) Chen developed the ER model

[Ans. (c) Network model represents the data in many-to one relationships]

3. (i) End users are the one who manage the license keys.

(ii) DBA are the one who stores, retrieve, update and delete data.

(iii) Choosing appropriate structures to represent data and store the data in the database is done by database designers.

(iv) Application programmers are involved in developing and designing the parts of DBMs

(a) i and ii (b) iii and iv

(c) i and iii (d) ii and iv

[Ans. (a) i and ii]

4. (i) Data redundancy not present in RDBMS
(ii) DBMS uses normalization to reduce redundancy
(iii) Distributed Database not supported by RDBMS
(iv) RDBMS uses keys and indexes to establish relationship.
(a) i and ii (b) ii and iii
(c) iii and iv (d) i and iv
[Ans. (b) ii and iii]

VERY SHORT ANSWERS 2 MARKS

1. What is database?

Ans. **(i)** Database is a repository collection of related data organized in a way that data can be easily accessed, managed and updated.
(ii) Database can be a soft ware or hardware based, with one sole purpose of storing data.

2. Differentiate data and information.

Ans. **(i)** Data are raw facts stored in a computer. A data may contain any character, text, word or a number.
(ii) Information is formatted data, which allows to be utilized in a significant way.

3. List the characteristics of DBMS.

Ans. **DBMS Supports Transactions :** It allows us to better handle and manage data integrity in real world applications where multi-threading is extensively used.

4. List the types of RDBMS software.

Ans. SQL server, Oracle, MySQL, MariaDB, SQLite.

5. What is E F Codd rules?

Ans. Database normalization was first proposed by Dr. Edgar F Codd as an integral part of RDBMS in order to reduce data redundancy and improve data integrity. These rules are known as E F Codd Rules.

6. Write a note on
(i) SELECT Operation
(ii) PROJECT Operation

Ans. **(i) SELECT Operation (symbol : σ):** The SELECT operation is used for selecting a subset with tuples according to a given condition.
(ii) PROJECT Operation (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.

SHORT ANSWERS 3 MARKS

1. What does the term database refers?

Ans. **(i)** A database is an organized collection of data, generally stored and accessed electronically from a computer system.
(ii) The term "database" is also used to refer to any of the DBMS, the database system or an application associated with the database.
(ii) Because of the close relationship between them, the term "database" is oft en used casually to refer to both a database and the DBMS used to manipulate it.

2. Write a note on DBMS or write a note on a software that allows us to create, define and manipulate database.

Ans. **(i)** A DBMS is a soft ware that allows us to create, define and manipulate database, allowing users to store, process and analyze data easily.
(ii) DBMS provides us with an interface or a tool, to perform various operations to create a database, storing of data and for updating data, etc.
(iii) DBMS also provides protection and security to the databases. It also maintains data consistency in case of multiple users.

3. List the components of DBMS.

Ans. The Database Management System can be divided into five major components as follows:
(i) Hardware
(ii) Software
(iii) Data
(iv) Procedures / Methods
(v) Database Access Languages

4. Fill up the blank.
(i) A table is known as a _____
(ii) A table row is known as a _____
(iii) A table column is known as a _____

Ans. **(i)** Relation
(ii) Tuple
(iii) Attribute

5. Identity which is a DBMS and RDBMS software from the following.

(i) SQlite
(ii) Foxpro
(iii) MySQL
(iv) Dbase

Ans. (i) RDBMS (ii) DBMS
(iii) RDBMS (iv) DBMS

6. Write the importance of using data model.

Ans. (i) A data model describes how the data can be represented and accessed from a software after complete implementation
(ii) It is a simple abstraction of complex real world data gathering environment.
(iii) The main purpose of data model is to give an idea as how the final system or software will look like after development is completed.

7. Write a short note on Relational data model.

Ans. (i) The Relational Database model was first proposed by E.F. Codd in 1970. It is the most widespread data model used for database applications around the world.
(ii) 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.
(iii) 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)).

8. Explain the data model that represent parent child relationship.

Ans. (i) Hierarchical model was developed by IBM as Information Management System.
(ii) 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.
(iii) One child can have only one parent but one parent can have many children. This model is mainly used in IBM Main Frame computers.

9. Write a short note on the database model, in which relationship are created by dividing the object into entity.

Ans. **Entity Relationship Model. (ER model) :**

(i) In this database model, relationship are created by dividing the object into entity and its characteristics into attributes.
(ii) It was developed by Chen in 1976. This model is useful in developing a conceptual design for the database.
(iii) 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.

10. List the types of DBMS users.

Ans. (i) Database Administrators(DBA)
(ii) Application or software developers
(iii) End User
(iv) Database designers.

11. What is Relational Algebra?

Ans. (i) Relational Algebra, was first created by Edgar F Codd while at IBM. It was used for modeling the data stored in relational databases and defining queries on it.
(ii) Relational Algebra is a procedural query language used to query the database tables using SQL.
(iii) Relational algebra operations are performed recursively on a relation (table) to yield an output. The output of these operations is a new relation, which might be formed by one or more input relations.

12. Write the symbol used for the following.

(i) SELECT (ii) PROJECT
(iii) Union (iv) Intersection
(v) Difference (vi) PRODUCT

Ans. (i) σ (ii) π (iii) $\cup$
(iv) $\cap$ (v) $-$ (vi) X

☆☆☆

CHAPTER 12

STRUCTURED QUERY LANGUAGE (SQL)

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. Which commands provide definitions for creating table structure, deleting relations, and modifying relation schemas.

(a) DDL (b) DML
(c) DCL (d) DQL

[Ans. (a) DDL]

2. Which command lets to change the structure of the table?

(a) SELECT (b) ORDER BY
(c) MODIFY (d) ALTER

[Ans. (d) ALTER]

3. The command to delete a table is

(a) DROP (b) DELETE
(c) DELETE ALL (d) ALTER TABLE

[Ans. (a) DROP]

4. Queries can be generated using

(a) SELECT (b) ORDER BY
(c) MODIFY (d) ALTER

[Ans. (a) SELECT]

5. The clause used to sort data in a database *[HY-2019]*

(a) SORT BY (b) ORDER BY
(c) GROUP BY (d) SELECT

[Ans. (b) ORDER BY]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

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

Ans. **Query :** SELECT * FROM student WHERE Age < = 18 ORDER BY Name;

2. Differentiate Unique and Primary Key constraint. *[PTA-6]*

Ans.

	Unique Key Constraint	Primary Key Constraint
(i)	The 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.
(ii)	The UNIQUE constraint can be applied only to fields that have also been declared as NOT NULL.	The Primary Key does not allow NULL values and therefore a field declared as Primary Key must have the NOT NULL constraint.

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

Ans.

Column constraint	Table constraint
Column constraint can be applied only to individual column.	Table constraint is applied to a group of one or more column.

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

Ans.

Command	Description	Component
Insert	Inserts data into a table	DML
Create	To create tables in the database	DDL

5. What is the difference between SQL and MySQL? *[PTA-5]*

Ans.

SQL	MySQL
Structured Query Language is a Language used for accessing databases.	MySQL is a database management system, like SQL Server, Oracle, Informix, Postgres, etc.
SQL is a DBMS	MySQL is a RDBMS

PART - III
ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. What is a constraint? Write short note on Primary key constraint. *[HY-2019]*

Ans. Constraints are used to limit the type of data that can go into a table. This ensures the accuracy and reliability of the data in the database. Constraints could be either on a column level or a table level. Constraint is a condition applicable on a field or set of fields.

Primary Constraint :

(i) This constraint declares a field as a Primary key which helps to uniquely identify a record.

(ii) It is similar to unique constraint except that only one field of a table can be set as primary key.

(iii) The primary key does not allow **NULL** values and therefore a field declared as primary key must have the **NOT NULL** constraint.

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

Ans. ALTER TABLE <table-name> ADD <column-name><data type><size>;

3. Write any three DDL commands. *[PTA-2]*

Ans. **Data Definition Language :**

(i) **Create Command :** To create tables in the database.

CREATE TABLE Student (Admno integer, Name char(20), Gender char(1), Age integer);

(ii) **Alter Command :** Alters the structure of the database.

ALTER TABLE Student ADD Address char;

(iii) **Drop Command :** Delete tables from database.

DROP TABLE Student;

4. Write the use of Savepoint command with an example.

Ans. (i) The **SAVEPOINT** command is used to temporarily save a transaction so that you can rollback to the point whenever required.

(ii) 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.

(iii) **Example :**

```
SAVEPOINT savepoint_name;
UPDATE Student SET Name = 'Mini'
                    WHERE Admno=105;
SAVEPOINT A;
```

5. Write a SQL statement using DISTINCT keyword.

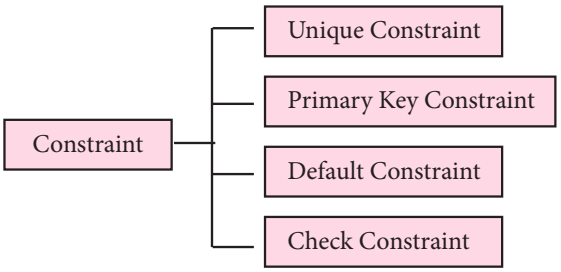
Ans. (i) The DISTINCT keyword is used along with the SELECT command to eliminate duplicate rows in the table. This helps to eliminate redundant data.

(ii) **For Example:** SELECT DISTINCT Place FROM Student;

PART - IV
ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. Write the different types of constraints and their functions. *[PTA-3]*

Ans. **Type of Constraints :** Constraints ensure database integrity, therefore known as database integrity constraints. The different type of constraints are :



Unique Constraint :

(i) This constraint ensures that no two rows have the same value in the specified columns. For example UNIQUE constraint applied on Admno of student table ensures that no two students have the same admission number and the constraint can be used as:

(ii) **CREATE TABLE Student :**

```
(
Admno integer NOT NULL UNIQUE, → Unique constraint
Name char (20) NOT NULL,
Gender char (1),
Age integer,
Place char (10),
);
```

(iii) The **UNIQUE** constraint can be applied only to fields that have also been declared as **NOT NULL**.

(iv) When two constraints are applied on a single field, it is known as multiple constraints. In the above Multiple constraints NOT NULL and UNIQUE are applied on a single field Admno, the constraints are separated by a space and at the end of the field definition a comma(,) is added. By adding these two constraints the field Admno must take some value ie. will not be NULL and should not be duplicated.

Primary Key Constraint :

(i) This constraint declares a field as a Primary key which helps to uniquely identify a record. It is similar to unique constraint except that only one field of a table can be set as primary key.

(ii) The primary key does not allow **NULL** values and therefore a field declared as primary key must have the **NOT NULL** constraint.

(iii) Example showing Primary Key Constraint in the student table:

(iv) **CREATE TABLE Student :**

```
(
Admno integer NOT NULL PRIMARY KEY, → Primary Key constraint
Name char(20)NOT NULL,
Gender char(1),
Age integer,
Place char(10),
);
```

(v) In the above example the Admno field has been set as primary key and therefore will help us to uniquely identify a record, it is also set NOT NULL, therefore this field value cannot be empty.

Default Constraint :

(i) 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.

(ii) Example showing DEFAULT Constraint in the student table:

(iii) **CREATE TABLE Student :**

```
(
Admno integer NOT NULL PRIMARY KEY,
Name char(20)NOT NULL,
Gender char(1),
Age integer DEFAULT = "17",
                → Default Constraint
Place char(10),
);
```

(iv) In the above example the "Age" field is assigned a default value of 17, therefore when no value is entered in age by the user, it automatically assigns 17 to Age.

Check Constraint :

(i) 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 showing check constraint in the student table:

(ii) **CREATE TABLE Student :**

```
(
Admno integer NOT NULL PRIMARY KEY
Name char(20)NOT NULL,
Gender char(1),
Age integer (CHECK<=19), → Check Constraint
Place char(10),
);
```

(iii) In the above example the check constraint is set to Age field where the value of Age must be less than or equal to 19.

(iv) The check constraint may use relational and logical operators for condition.

Table Constraint :

(i) When the constraint is applied to a group of fields of the table, it is known as Table constraint. The table constraint is normally given at the end of the table definition.

(ii) Let us take a new table namely Student1 with the following fields Admno, Firstname, Lastname, Gender, Age, Place:

(iii) CREATE TABLE Student 1 :
(
Admno integer NOT NULL,
Firstname char(20),
Lastname char(20),
Gender char(1),
Age integer,
Place char(10),
PRIMARY KEY (Firstname, Lastname) → Table constraint
);

(iv) In the above example, the two fields, Firstname and Lastname are defined as Primary key which is a Table constraint.

2. Consider the following employee table. Write SQL commands for the qtns.(i) to (v). *[PTA-2]*

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.

Ans. (i) SELECT * FROM Employee ORDER BY PAY DESC;

(ii) SELECT * FROM Employee WHERE ALLOWANCE BETWEEN 5000 AND 7000;

(iii) DELETE FROM Employee WHERE DESIG='Mechanic';

(iv) INSERT INTO Employee (empcode, name, desig, pay, allowance) VALUES (S1002, Baskaran, Supervisor, 29000, 12000);

(v) SELECT * FROM Employee WHERE DESIG='Operator';

3. What are the components of SQL? Write the commands in each. *[Govt. MQP-2019]*

Ans. **Components of SQL :** SQL commands are divided into five categories:

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

Data Definition Language :

(i) The Data Definition Language (DDL) consist of SQL statements used to define the database structure or schema.

(ii) It simply deals with descriptions of the database schema and is used to create and modify the structure of database objects in databases.

(iii) SQL commands which comes under Data Definition Language are :

Create	To create tables in the database.
Alter	Alters the structure of the database.
Drop	Delete tables from database.
Truncate	Remove all records from a table, also release the space occupied by those records.

Data Manipulation Language :

(i) A Data Manipulation Language (DML) is a computer programming language used for adding (inserting), removing (deleting), and modifying (updating) data in a database.

(ii) In SQL, the data manipulation language comprises the SQL-data change statements, which modify stored data but not the schema of the database table.

(iii) SQL commands which comes under Data Manipulation Language are :

Insert	Inserts data into a table
Update	Updates the existing data within a table.
Delete	Deletes all records from a table, but not the space occupied by them.

Data Control Language :

(i) A Data Control Language (DCL) is a programming language used to control the access of data stored in a database. It is used for controlling privileges in the database (Authorization).

(ii) The privileges are required for performing all the database operations such as creating sequences, views of tables etc.

(iii) SQL commands which come under Data Control Language are :

Grant	Grants permission to one or more users to perform specific tasks.
Revoke	Withdraws the access permission given by the GRANT statement.

Transactional Control Language :

(i) Transactional control language (TCL) commands are used to manage transactions in the database. These are used to manage the changes made to the data in a table by DML statements.

(ii) SQL command which come under Transfer Control Language are :

Commit	Saves any transaction into the database permanently.
Roll back	Restores the database to last commit state.
Save point	Temporarily save a transaction so that you can rollback.

Data query language :

(i) The Data Query Language consist of commands used to query or retrieve data from a database.

(ii) One such SQL command in Data Query Language is

Select	It displays the records from the table.

4. Construct the following SQL statements in the student table.

(i) SELECT statement using GROUP BY clause.

(ii) SELECT statement using ORDER BY clause.

Ans. **(i) GROUP BY clause :**

- The GROUP BY clause is used with the SELECT statement to group the students on rows or columns having identical values or divide the table in to groups.
- For example to know the number of male students or female students of a class, the GROUP BY clause may be used. It is mostly used in conjunction with aggregate functions to produce summary reports from the database.
- The syntax for the GROUP BY clause is
- SELECT <column-names> FROM <table-name> GROUP BY <column-name> HAVING condition];
- To apply the above command on the student table :
- SELECT Gender FROM Student GROUP BY Gender;
- The following command will give the below given result :

Gender
M
F

- **SELECT Gender, count(*) FROM Student GROUP BY Gender;**

Gender	count(*)
M	5
F	3

(ii) ORDER BY clause :

- The **ORDER BY** clause in SQL is used to sort the data in either ascending or descending based on one or more columns.
  - **(a)** By default ORDER BY sorts the data in ascending order.
  - **(b)** We can use the keyword DESC to sort the data in descending order and the keyword ASC to sort in ascending order.
- The ORDER BY clause is used as :
- SELECT<column-name>[,<column-name>,….] FROM <table-name>ORDER BY<column1>,<column2>,…ASC| DESC ;
- **For example :**

To display the students in alphabetical order of their names, the command is used as

- **SELECT * FROM Student ORDER BY Name;**

The above student table is arranged as follows :

Admno	Name	Gender	Age	Place
104	Abinandh	M	18	Chennai
101	Adarsh	M	18	Delhi
102	Akshith	M	17	Bangalore
100	Ashish	M	17	Chennai
103	Ayush	M	18	Delhi
106	Devika	F	19	Bangalore
107	Hema	F	17	Chennai
105	Revathi	F	19	Chennai

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

Ans. CREATE TABLE employee
(
empcode integer NOTNULL,
name char(20),
desigchar(20),
Pay integer,
allowance integer,
PRIMARY KEY (empno)
);

Hands on Experience

1. Create a query of the student table in the following order of field name, age, place and admno.

Ans. CREATE TABLE Student (Name char(30), age integer, place char(30), admno integer));

2. Create a query to display the student table with students of age more than 18 with unique city.

Ans. SELECT*FROM student WHERE age >= 18 GROUP BY city;

3. Create a employee table with the following fields employee number, employee name, designation, data of joining and basic pay.

Ans. CREATE TABLE employee (empNo integer, ename char(30), desig char(30), doj datetime, basic integer);

4. In the above table set the employee number as primary key and check for NULL values in any field.

Ans. CREATE TABLE employee (empno ineger NOT NULL PRIMARY KEY, ename char(30) NOT NULL, desig char(30), doj datetime, basic integer);

5. Prepare a list of all employees who are Managers..

Ans. SELECT*FROM employee WHERE desig = 'Managers';

PTA Questions and Answers

1 MARK

1. Pick odd one : *[PTA-1]*

(a) Commit (b) Roll back
(c) Save point (d) Revoke

[Ans. (d) Revoke]

2. Pick Odd one: *[PTA-2]*

(a) INSERT (b) DELETE
(c) UPDATE (d) TRANCATE

[Ans. (D) TRANCATE]

3. The TCL command used to restores the database to the last commit state. *[PTA-3]*

(a) Commit (b) SavePoint
(c) Insert (d) Rollback

[Ans. (d) Rollback]

4. The statement in SQL is used to retrieve data from a table in a database: *[PTA-3]*

(a) SELECT (b) CREATE
(c) DISTINCT (d) ORDER BY

[Ans. (a) SELECT]

5. The SQL command 'Truncate' comes under: *[PTA-4]*

(a) DDL (b) DML
(c) TCL (d) DQL

[Ans. (a) DDL]

6. Match the following: *[PTA-5]*

(a) DELETE - (i) DDL
(b) DROP - (ii) DQL
(c) SELECT - (iii) TCL
(d) COMMIT - (iv) DML

(a) a-iv, b-iii, c-ii, d-i (b) a-iv, b-i, c-ii, d-iii
(c) a-i, b-iv, c-iii, d-ii (d) a-i, b-iii, c-iv, d-ii

[Ans. (b) a-iv, b-i, c-ii, d-iii]

7. **Pick odd one:** *[PTA-6]*

(a) CREATE (b) UPDATE
(c) ALTER (d) DROP

[Ans. (B) UPDATE]

2 MARKS

1. **List any four DDL commands.** *[PTA-1]*

Ans. **(i)** ALTER **(ii)** TRUNCATE
(iii) DROP **(iv)** DELETE

2. **Write a Python code to create a database in SQLite.** *[PTA-3]*

Ans. To create a database, type the following command in the prompt:
CREATE DATABASE database_name;
For example ; To create a database to store the tables:
CREATE DATABASE stud;

3. **What are DCL commands in SQL?** *[PTA-4]*

Ans. **SQL commands which come under Data Control Language are:**

(i) **Grant :** Grants permission to one or more users to perform specific tasks.

(ii) **Revoke :** Withdraws the access permission given by the GRANT statement.

3 MARKS

1. **Compare Delete, Truncate and Drop in SQL.**

(or)

What is the use of DELETE, TRUNCATE and DROP commands in SQL? *[PTA-1, 3]*

Ans.

Delete	Truncate	Drop
The DELETE command permanently removes one or more records from the table. It removes the entire row, not individual fields of the row. so no field arguments is needed. **Syntax :** DELETE FROM table-name WHERE condition;	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;	The DROP TABLE command is used to remove a table from the database once a table is dropped we cannot get it back, so be careful while using DROP TABLE command. **Syntax :** DROP TABLE table-name;

5 MARKS

1. **Explain about the TCL commands with suitable examples.** *[PTA-1]*

Ans. **TCL commands :**

(i) **COMMIT command :** The COMMIT command is used to permanently save any transaction to the database. When any DML commands like INSERT, UPDATE, DELETE commands are used, the changes made by these commands are not permanent. It is marked permanent only after the COMMIT command is given from the SQL prompt. Once the COMMIT command is given, the changes made cannot be rolled back. The COMMIT command is used as COMMIT;

(ii) **ROLLBACK command :**

The ROLLBACK command restores the database to the last commited state. It is used with SAVEPOINT command to jump to a particular savepoint location. The syntax for the ROLLBACK command is :

ROLL BACK TO save point name;

(iii) **SAVEPOINT command :**

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.

2. **Explain about DML commands of SQL.** *[PTA-4]*

Ans. **DML COMMANDS :**

Once the schema or structure of the table is created, values can be added to the table. The DML commands consist of inserting, deleting and updating rows into the table.

(i) **INSERT command :**

The INSERT command helps to add new data to the database or add new records to thetable. The command is used as follows:

INSERT INTO <table-name> [column-list]
VALUES (values);

INSERT INTO Student (Admno, Name, Gender, Age, Place)
VALUES (100,' Ashish',' M', 17,' Chennai');
INSERT INTO Student (Admno, Name, Gender, Age, Place)
VALUES (101, 'Adarsh', 'M', 18, 'Delhi');
Two new records are added to the table as shown below:

Admno	Name	Gender	Age	Place
100	Ashish	M	17	Chennai
101	Adarsh	M	18	Delhi

(ii) DELETE COMMAND

The DELETE command permanently removes one or more records from the table. It removes the entire row, not individual fields of the row, so no field argument is needed. The DELETE command is used as follows :
DELETE FROM table-name WHERE condition;
For example to delete the record whose admission number is 104 the command is given as follows:
DELETE FROM Student WHERE Admno=104;

104	Abinandh	M	18	Chennai

The following record is deleted from the Student table.
To delete all the rows of the table, the command is used as :
DELETE * FROM Student;
The table will be empty now and could be destroyed using the DROP command.

(iii) UPDATE COMMAND

The UPDATE command updates some or all data values in a database. It can update one or more records in a table. The UPDATE command specifies the rows to be changed using the WHERE clause and the new data using the SET keyword. The command is used as follows:
UPDATE <table-name> SET column-name = value, column-name = value,…
WHERE condition;
For example to update the following fields:
UPDATE Student SET Age = 20 WHERE Place = "Bangalore";
The above command will change the age to 20 for those students whose place is "Bangalore". The table will be as updated as below:

Admno	Name	Gender	Age	Place
100	Ashish	M	17	Chennai
101	Adarsh	M	18	Delhi
103	Akshith	M	20	Bangalore
104	Ayush	M	18	Delhi

To update multiple fields, multiple field assignment can be specified with the SET clause separated by comma. For example to update multiple fields in the Student table, the command is given as:
UPDATE Student SET Age=18, Place = 'Chennai' WHERE Admno = 102;

3. What are the functions performed by DDL. *[PTA-6]*

Ans. **(i)** It should identify the type of data division such as data item, segment, record and database file.
(ii) It gives a unique name to each data item type, record type, file type and data base.
(iii) It should specify the proper data type.
(iv) It should define the size of the data item.
(v) It may define the range of values that a data item may use.
(vi) It may specify privacy locks for preventing unauthorized data entry.

Government Exam Questions and Answers

1 MARK

1. Which command saves any transaction in database permanently? *[QY-2019]*
(a) save (b) save point
(c) commit (d) roll back
[Ans. (c) Commit]

2. The original version of SQL is released in the year _____. *[QY-2019]*
(a) 1970 (b) 1980
(c) 1986 (d) 1992
[Ans. (a) 1970]

3. Which of the following is not a Relational operator? *[HY-2019]*
(a) = (b) = = (c) > = (d) < =
[Ans. (b) = =]

2 MARKS

1. Define Primary Key Constraint. *[QY-2019]*

Ans. This 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.

5 MARKS

1. Consider the following student table. Write SQL command for the questions (i) to (v). *[HY-2019]*

Roll No.	Name	Group
1001	Ganesh	A1
1002	Kumar	A2
1003	Mani	B1
1004	Raju	A1
1005	Thulasi	A2
1006	Geetha	B1
1007	Latha	A1
1008	Banu	A2
1009	Kavya	B1

i) To display the details of all students in ascending order of name.

ii) To display all students in A2 group.

iii) To display the details group wise.

iv) To add new row.

v) To remove students who are in B1 group.

Ans. i) SELECT*FROM student ORDER BY name Asc;

ii) SELECT*FROM student GROUP By A2;

iii) SELECT*FROM Student GROUP By Group;

iv) INSERT INTO Student (Roll no, Name, Group) VALUES (10,10, 'Ashish', 'A2');

v) DELETE FROM Student WHERE Group = B1;

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Which of the following is a standard programming language to access and manipulate databases?

(a) MySQL (b) SQL
(c) PHP (d) Python

[Ans. (b) SQL]

2. Which of the following language was designed for managing and accessing data in RDBMS?

(a) DBMS (b) DDL
(c) DML (d) SQL

[Ans. (d) SQL]

3. SQL stands for

(a) Standard Query Language
(b) Secondary Query Language
(c) Structural Query Language
(d) Standard Question Language

[Ans. (c) Structural Query Language]

4. SQL originally called as

(a) DBMS (b) RDBMS
(c) SQL (d) SQLITE

[Ans. (c) SQL]

5. Find out the odd man out :

(a) MS SQL servers
(b) Microsoft Access
(c) IBM DB2
(d) Dbase **[Ans. (d) Dbase]**

6. Which of the following is not a RDBMS package?

(a) Oracle (b) Foxpro
(c) DBbase (d) MySQL
(e) b and c **[Ans. (e) b and c]**

7. The data in RDBMS, is stored in database objects called

(a) Queries (b) Languages
(c) Relations (d) Tables

[Ans. (d) Tables]

8. Which of the following is a collection of data entries?

(a) Database (b) Table
(c) Dbase (d) SQL

[Ans. (b) Table]

9. The specific related information about every record in the table is maintained by
(a) language (b) relation
(c) tuple (d) field
[Ans. (d) field]

10. DDL expansion is
(a) Data Defined Language
(b) Data Definition Language
(c) Definition Data Language
(d) Dictionary Data Language
[Ans. (b) Data Definition Language]

11. DML stand for
(a) Data Manipulation language
(b) Data Meaningful Language
(c) Directional Manipulate Language
(d) Data Management Language
[Ans. (a) Data Manipulation language]

12. Which of the following processing skills of SQL provides commands for defining relation schemes?
(a) MySQL (b) DDL
(c) DML (d) DCL
[Ans. (b) DDL]

13. Which component of SQL includes commands to insert, delete and modify tables in database?
(a) DCL (b) TCL
(c) DDL (d) DML
[Ans. (d) DML]

14. Which processing skills of SQL includes commands of access rights to creations and views of tables?
(a) View definition (b) Integrity
(c) Authorization
(d) Transaction control
[Ans. (c) Authorization]

15. WAMP stands for
(a) Windows, Android, MySQL, PHP
(b) Windows, Apache, MySQL, Python
(c) Windows, APL, MySQL, PHP
(d) Windows, Apache, MySQL, PHP
[Ans. (d) Windows, Apache, MySQL, PHP]

16. Which of the following used to serve live websites?
(a) Windows (b) Google
(c) WAMP (d) Google Chrome
[Ans. (c) WAMP]

17. Into how many categories the SQL commands are divided?
(a) 4 (b) 5 (c) 3 (d) 7
[Ans. (b) 5]

18. Which of the following is not a category of SQL command?
(a) DDL (b) DDL
(c) DML (d) TCL
[Ans. (a) DDL]

19. DCL stands for
(a) Dynamic Control Language
(b) Data Communication Language
(c) Data Control Language
(d) Dynamic Data Control Language
[Ans. (c) Data Control Language]

20. TCL stands for
(a) Transmission Control Language
(b) Transfer Communication Language
(c) Transaction Communication Language
(d) Transaction control Language
[Ans. (b) Transfer Communication Language]

21. DQL Stands for
(a) Database Query Language
(b) Data Query Language
(c) Defined Query Language
(d) Dynamic Query Language
[Ans. (b) Data Query Language]

22. Which of the following component simply deals with description of the database schema?
(a) DML (b) DDL
(c) DCL (d) DQL
[Ans. (b) DDL]

23. Which component provides a self definitions to specify storage structure used by the database system?
(a) DML (b) DQL
(c) DDL (d) TCL
[Ans. (c) DDL]

24. Which of the following is not a SQL DDL commands?
(a) Alter (b) Drop
(c) Grant (d) Truncate
[Ans. (c) Grant]

25. The SQL DDL command removes all records from a table and also release the space occupied by these records is
(a) Delete (b) Truncate
(c) Rollback (d) Drop
[Ans. (b) Truncate]

26. Which of the following SQL DDL command that delete tables from database?
(a) Drop (b) Delete
(c) Truncate (d) Rollback
[Ans. (a) Drop]

27. Which of the following is not a type of DML?
(i) Procedural DML
(ii) Non-Procedural DML
(iii) Programmable DML
(a) i only (b) ii only
(c) iii only (d) ii and iii
[Ans. (c) iii only]

28. Which DML requires a user to specify what data is needed without specifying how to get it?
(a) Produced DML
(b) Non-Procedural DML
(c) Programmable DML
(d) Procedural DQL
[Ans. (b) Non-Procedural DML]

29. The SQL DML command used remove all records from a table but not the space occupied by them is
(a) Drop (b) Truncate
(c) Delete (d) Del
[Ans. (c) Delete]

30. Which of the following used to control the access of data stored in a database?
(a) DCL (b) DML
(c) DDL (d) DQL
[Ans. (a) DCL]

31. Which of the following SQL DCL command gives permission to one or more users to perform specific tasks?
(a) GIVE (b) ORDER
(c) GRANT (d) WHERE
[Ans. (c) GRANT]

32. The SQL DCL command withdraws the access permission given by the GRANT statement is
(a) WITHDRAWN (b) REMOVE
(c) DELETE (d) REVOKE
[Ans. (d) REVOKE]

33. Revoke command belongs to
(a) DML (b) DCL
(c) DQL (d) DDL
[Ans. (b) DCL]

34. Which of the following commands are used to manage the changes made to the data in table by DML statements?
(a) TCL (b) DML
(c) DDL (d) DLL
[Ans. (a) TCL]

35. Which of the following is not a SQL TCL command?
(a) Commit
(b) Roll back
(c) Revoke
(d) Save point **[Ans. (c) Revoke]**

36. The SQL DQL command used to display all the records from the table is
(a) Select (b) display
(c) Show (d) Select all
[Ans. (a) Select]

37. Which SQL TCL command save a transaction temporarily
(a) Commit (b) Roll back
(c) Save point (d) None of these
[Ans. (c) Save point]

38. Which of the following command used to retrieve data from a database?
(a) DDL (b) DQL
(c) DML (d) DCL
[Ans. (b) DQL]

39. The data in a database is stored based on the kind of value stored is known as
(a) language (b) function
(c) record (d) datatype
[Ans. (d) datatype]

40. Which of the following SQL standard recognized only Text and Number data type?
(a) ANSI (b) TCL
(c) DML (d) DCL
[Ans. (a) ANSI]

41. Which of the following data type same as real expect the precision may exceed 64?
(a) float (b) real
(c) double (d) long real
[Ans. (c) double]

42. Double data type precision may exceed
(a) 64 (b) 74 (c) 54 (d) 14
[Ans. (a) 64]

43. Which of the following is not a SQL predetermined set of commands to work on databases?
(a) keywords (b) alters
(c) clause (d) commands
[Ans. (b) alters]

44. Which of the following SQL predetermined commands are understood as instructions?
(a) Arguments (b) Commands
(c) Clause (d) Keywords
[Ans. (d) Keywords]

45. Which of the following have a special meaning in SQL?
(a) Keywords (b) Commands
(c) Clause (d) Arguments
[Ans. (a) Keywords]

46. Which of the following begin with a keyword and consists of keyword and argument?
(a) Commands (b) Statement
(c) Clauses (d) Data
[Ans. (c) Clauses]

47. Which of the following SQL DDl command used to create a table?
(a) CREATE (b) CREATE TABLE
(c) NEW TABLE (d) DDL TABLE
[Ans. (b) CREATE TABLE]

48. Which of the following must be specified when a table is created?
(a) column name (b) datatype
(c) Size (d) all of these
[Ans. (d) all of these]

49. Which of the following are used to limit the type of data that can go into a table?
(a) Commands (b) Constraint
(c) Keywords (d) Arguments
[Ans. (b) Constraint]

50. Which of the following ensures the accuracy and reliability of the data in the database?
(a) Constraint (b) Table
(c) Classes (d) Data types
[Ans. (a) Constraint]

51. Which constraint apply to a group of one or more columns?
(a) Column (b) Default
(c) Unique (d) Table
[Ans. (d) Table]

52. The constraint enforces a field to always contain a value is
(a) NULL (b) NOT NULL
(c) YES (d) ALWAYS
[Ans. (b) NOT NULL]

53. How many types of database integrity constraints are there?
(a) 4 (b) 5
(c) 3 (d) Multiple
[Ans. (a) 4]

54. Which of the following is not a database integrity constraint?
(a) Table (b) Unique
(c) Default (d) Check
[Ans. (a) Table]

55. Which of the following constraint ensures that no two rows have the same value in the specified columns?
(a) Primary key (b) Check
(c) Unique (d) Default
[Ans. (c) Unique]

56. Which of the following ensures database integrity constraints?
(a) Keywords (b) Keys
(c) Table (d) Constraint
[Ans. (d) Constraint]

57. Defined multiple constraints are separated by
(a) comma (b) space
(c) semicolon (d) colon
[Ans. (b) space]

58. Which of the following should be added at the end of field definition?
(a) space (b) comma
(c) colon (d) semicolon
[Ans. (b) comma]

59. Which of the following constraint helps to uniquely identify a record in the database?
(a) Default (b) Unique
(c) Primary key (d) Check
[Ans. (c) Primary key]

60. Which of the following constraint does not allow NULL values?
(a) Unique (b) Primary key
(c) Check (d) a and b
[Ans. (b) Primary key]

61. Which of the following keyword shows that the field value cannot be empty?
(a) NULL (b) NOT NULL
(c) NO NULL (d) NO VALUE
[Ans. (b) NOT NULL]

62. Which constraint helps to set a limit value placed for a field?
(a) Default (b) Key
(c) Unique (d) Check
[Ans. (d) Check]

63. Which of the following constraint use relational and logical operators for condition?
(a) Primary Key (b) Unique
(c) Check (d) Table
[Ans. (c) Check]

64. Which of the following constraint is applied to a group of field of the table?
(a) Primary Key (b) Table
(c) Properties (d) Unique
[Ans. (b) Table]

65. The constraint defined only at the end of table definition is
(a) Table (b) Unique
(c) Primary Key (d) Check
[Ans. (a) Table]

66. Which of the following command helps to add new records to the table?
(a) Insert (b) Add New
(c) Add row (d) Insert new
[Ans. (a) Insert]

67. In the INSERT command the fields that are omitted will have
(a) default value (b) Null value
(c) No value (d) a or b
[Ans. (b) Null value]

68. The command to delete all the rows in the table is
(a) DELETE ALL FROM tablename
(b) DELETE tablename
(c) DELETE * FROM tablename
(d) DELETE * FROM tablename ALL
[Ans. (c) DELETE * FROM tablename]

69. Which of the following command replaces some or all data values in a database?
(a) REPLACE (b) UPDATE
(c) SET (d) none of these
[Ans. (b) UPDATE]

70. Which keywords are not used in the command used to replace a data value in a database?
(a) UPDATE (b) SET
(c) WHERE (d) ADD
[Ans. (d) ADD]

71. To update multiple fields with the SET clause in UPDATE command the field shout be separated by
(a) space (b) comma
(c) colon (d) semi-colon
[Ans. (b) comma]

72. Which of the following keyword not used in ALTER command?
(a) ADD (b) MODIFY
(c) SET
(d) DROP COLUMN **[Ans. (c) SET]**

73. Which of the following command not used to delete a table?
(a) DELETE (b) TRUNCATE
(c) DROP (d) REMOVE
[Ans. (d) REMOVE]

74. Which command is used to retrieve a subset of records from one or more tables?
(a) QUERY (b) SUBSET
(c) SET (d) SELECT
[Ans. (d) SELECT]

75. Which of the following keyword used in SELECT command that helps to eliminate redundant data?
(a) ELIMINATE (b) REDUNDANT
(c) DISTINCT (d) DUPLICATE
[Ans. (c) DISTINCT]

76. Which keyword used in SELECT command that retains duplicate rows?
(a) DISTINCT (b) NULL
(c) RETAIN (d) ALL
[Ans. (d) ALL]

77. The clause in the SELECT command specifies the criteria for getting the desired result is
(a) CHECK (b) DISTINCT
(c) DESIRED (d) WHERE
[Ans. (d) WHERE]

78. Which keyword is used to specify the list of values which must be matched with the record values?
(a) NOT IN (b) BETWEEN
(c) IN (d) NOT BETWEEN
[Ans. (c) IN]

79. The keyword used to SELECT command displays only those records that do not match in the list is
(a) IN NOT (b) NOT IN
(c) NOT BETWEEN (d) NOT WHERE
[Ans. (b) NOT IN]

80. The keyword used to sort the records in ascending order is
(a) ASCD (b) ASD
(c) ASCE (d) ASC
[Ans. (d) ASC]

81. The clause used to filter the records in the table is
(a) ORDER (b) FILTER
(c) WHERE (d) GROUP
[Ans. (c) WHERE]

82. Which clause helps to extract only those records which statify the given condition?
(a) EXTRACT (b) WHERE
(c) GROUP (d) COMMIT
[Ans. (b) WHERE]

83. Which keyword is used to divide the table into groups?
(a) DIVIDE BY (b) ORDER BY
(c) GROUP BY (d) HAVING
[Ans. (c) GROUP BY]

84. Which clause SELECT command is used to produce summary report form the database?
(a) GROUP BY (b) REPORT BY
(c) ORDER BY (d) WHERE BY
[Ans. (a) GROUP BY]

85. Which clause can be used along with GROUP BY clause and SELECT statement to include aggregate function on them?
(a) WHERE (b) FROM
(c) HAVING (d) COMMIT
[Ans. (c) HAVING]

CHOOSE AND FILL IN THE BLANKS

1. _____ allows the user to create, retrieve, alter and transfer information among databases?
(a) SQL (b) DBMS
(c) DDL (d) EDBMS
[Ans. (a) SQL]

2. A _____ supports the development, administration and use of database platforms.
(a) SQL (b) DBMS
(c) MySQL (d) CRUD
[Ans. (b) DBMS]

3. RDBMS is a type of _____ with a row based table structure that connects related data elements
(a) CRUD (b) SQL
(c) DBMS (d) Informix
[Ans. (c) DBMS]

4. A _____ consists of row and columns.
(a) Table (b) Database
(c) SQL (d) DBMS
[Ans. (a) Table]

5. A_____ is a collection of related fields in a table.
(a) Attributes (b) SQL
(c) Record (d) Relations
[Ans. (c) Record]

6. After the database has been created, the data can be manipulated using _____ procedures.
(a) TCL (b) DCL
(c) DQL (d) DML
[Ans. (d) DML]

7. The DML is basically of _____ types
(a) 3 (b) 2 (c) 4 (d) 5
[Ans. (b) 2]

8. _____ is used for controlling privileges in the database?
(a) DML (b) DCL
(c) DDl (d) DQL
[Ans. (b) DCL]

9. All the values in a given field must be of same _____.
(a) command (b) datatype
(c) record (d) name
[Ans. (b) datatype]

10. Minimum _____ colomn is required to create a table.
(a) One (b) Two
(c) Three (d) Four
[Ans. (a) One]

11. _____ is a condition application on a field or set of fields?
(a) Class
(b) Control structure
(c) Constraint (d) Arguments
[Ans. (c) Constraint]

12. The Primary key constraint is similar to _____ constraint.
(a) Unique (b) Check
(c) Default (d) none of the these
[Ans. (a) Unique]

13. The _____ command is used to modify the table structure (schema)
(a) ALTER (b) CHANGE
(c) REPLACE (d) MODIFY
[Ans. (a) ALTER]

14. A _____ is a command to get a desired result from the database table.
(a) TABLE (b) QUERY
(c) FORM (d) REPORT
[Ans. (b) QUERY]

15. The _____ keyword is used along with the SELECT command to eliminate duplicate rows in the table?
(a) DUPLICATE (b) DISTINCT
(c) ELIMINATE (d) a or b
[Ans. (b) DISTINCT]

16. The _____ keyword defines a range of values the record must fall into make the condition true.
(a) BETWEEN (b) RANGE
(c) IN (d) WHERE
[Ans. (a) BETWEEN]

17. The NULL value in the field can be searched in a table using the _____ in the WHERE clause.
(a) ==NULL (b) NULL
(c) ISNULL (d) NOT NULL
[Ans. (c) ISNULL]

18. The _____ symbol is used with the COUNT to induce the NULL values.
(a) + (b) * (c) >= (d) =
[Ans. (b) *]

19. _____ is used with SAVEPOINT command to jump to a particular savepoint location.
(a) COMMINT (b) ROLLBACK TO
(c) HAVING (d) WHERE
[Ans. (b) ROLL BACK TO]

CHOOSE THE CORRECT PAIR

1.	a)	DQL	Database Query Language
	b)	TCL	Transmission Control Language
	c)	DCL	Data Communication Language
	d)	DDL	Data Definition Language

[Ans. (d) DDL – Data Definition Language]

2.	a)	Update	SQL DCL command
	b)	Commit	SQL TCL command
	c)	Insert	SQL DML command
	d)	Create	SQL DDL command

[Ans. (c) Insert - SQL DML command]

CHOOSE THE INCORRECT PAIR

1.	a)	Drop	SQL DDL command
	b)	Delete	SQL DDL command
	c)	Truncate	SQL DDL command
	d)	Grant	SQL DDL command

[Ans. (b) Delete – SQL DDL command]

2.	a)	DCL	Data Communication Language
	b)	DQL	Data Query Language
	c)	DCL	Data Content Language
	d)	DML	Data Manipulation Language

[Ans. (a) DCL – Data Communication Language]

CHOOSE THE CORRECT STATEMENT

1. (1) INSERT To student VALUES (104, 'chennai');
(2) DELETE ROW FROM student WHERE Admno = 1002;
(3) UPDATE student SET Age =18 WHERE city = ' chennai';
(4) ALTER TABLE student MODIFY Address char (25);
(a) 1 (b) 2 (c) 3 (d) 3, 4
[Ans. (d) 3, 4]

CHOOSE THE INCORRECT STATEMENT

1. (1) Unique constraint ensures that no two rows have same value in the specified columns.
(2) Primary Key constraint does not help to identify a record in the table.
(3) While creating table, no default value for the field is assigne(d)
(4) Check constraint use only Assignment operator for condition.
(5) Constraints does not ensure database integrity.

(a) 1, 4 (b) 2, 4, 5
(c) 4, 5 (d) 3, 4, 5

[Ans. (c) 4, 5]

2. 1. ALTER command is used to add a new column to the table
2. ALTER command is used to rename the existing column name
3. ALTER command does not change the data type of any column.
4. ALTER command not used to delete the column from the table

(a) 3, 4 (b) 1, 2
(c) 2, 3 (d) only 3

[Ans. (a) 3, 4]

3. (a) TRUNCATE command is used to delete all the rows from the table.
(b) DROP TABLE is used to remove a table from the database.
(c) SELECT command is used to retrieve a subset of records from tables.
(d) While using DROP TABLE command the table must be empty.
(e) none of the above

[Ans. (e) none of the above]

VERY SHORT ANSWERS 2 MARKS

1. Expand
(i) SQL (ii) DBMS (iii) RDBMS

Ans. **(i)** SQL –Structured Query Language
(ii) DBMS-Database Management System
(iii) RDBMS- Relational Database Management System.

2. What is SQL?

Ans. **(i)** The Structured Query Language (SQL) is a standard programming language to access and manipulate databases.
(ii) SQL allows the user to create, retrieve, alter, and transfer information among databases.
(iii) It is a language designed for managing and accessing data in a Relational Data Base Management System (RDBMS).

3. List few RDBMS packages.

Ans. Oracle, MySQL, MS SQL Server, IBM DB2 and Microsoft Access are RDBMS packages.

4. What is RDBMS ?

Ans. RDBMS is a type of DBMS with a row-based table structure that connects related data elements and includes functions related to Create, Read, Update and Delete operations, collectively known as CRUD.

5. Expand
(i) DDL
(ii) DML
(iii) WAMP

Ans. **(i)** DDL - Data Definition Language
(ii) DML - Data Manipulation Language
(iii) WAMP - Windows, Apache, MySQL, PHP

6. What is the use of WAMP?

Ans. WAMP stands for "Windows, Apache, MySQL and PHP" It is often used for web development and internal testing, but may also be used to serve live websites.

7. Define Data Definition Language.

Ans. **Functions performed by DDL :**
(i) The Data Definition Language (DDL) consist of SQL statements used to define the database structure or schema. It simply deals with descriptions of the database schema and is used to create and modify the structure of database objects in databases.
(ii) The DDL provides a set of definitions to specify the storage structure and access methods used by the database system.

8. List the SQL DDL commands .Explain each.

Ans. (i) **Create** : To create tables in the database.

(ii) **Alter** : Alters the structure of the database.

(iii) **Drop** : Delete tables from database.

(iv) **Truncate** : Remove all records from a table, also release the space occupied by those records.

9. Define Data Manipulation Language.

Ans. (i) A Data Manipulation Language (DML) is a computer programming language used for adding (inserting), removing (deleting), and modifying (updating) data in a database.In SQL, the data manipulation language comprises the SQL-data change statements, which modify stored data but not the schema of the database table.

(ii) After the database schema has been specified and the database has been created, the data can be manipulated using a set of procedures which are expressed by DML.

10. What are two basic types of DML.

Ans. **The DML is basically of two types :**

(i) **Procedural DML** – Requires a user to specify what data is needed and how to get it.

(ii) **Non-Procedural DML** - Requires a user to specify what data is needed without specifying how to get it.

11. List the SQL DML commands.

Ans. (i) **Insert** : Inserts data into a table

(ii) **Update** : Updates the existing data within a table.

(iii) **Delete** : Deletes all records from a table, but not the space occupied by them.

12. Define TCL.

Ans. **Transactional Control Language (TCL)** commands are used to manage transactions in the database. These are used to manage the changes made to the data in a table by DML statements.

13. Explain the following SQL TCL commands.

(i) Commit

(ii) Roll back

(iii) Save point

Ans. (i) **Commit :** Saves any transaction into the database permanently.

(ii) **Roll back :**Restores the database to last commit state.

(iii) **Save point :** Temporarily save a transaction so that you can rollback.

14. Write the working of the following commands

(i) Truncate (ii) Delete

(iii) Revoke

Ans. (i) **Truncate :** Remove all records from a table, also release the space occupied by those records.

(ii) **Delete :** Deletes all records from a table, but not the space occupied by them.

(iii) **Revoke :** Withdraws the access permission given by the GRANT statement.

15. Write a note on data query language.

Ans. **Data query language :** The Data Query Language consist of commands used to query or retrieve data from a database. One such SQL command in Data Query Language is

Select	It displays the records from the table.

16. Write the syntax of creating table in database.

Ans. The syntax of **CREATE TABLE** command is :

CREATE TABLE <table-name>
(<column name><data type>[<size>]
(<column name><data type>[<size>]……
);

17. Write the syntax of creating table with constraint.

Ans. The syntax for a table created with constraint is given as below:

CREATE TABLE <table-name>
(<column name><data type>[<size>]
<column constraint>,
(<column name><data type>[<size>]
<column constraint>……
<table constraint>(<column name>,
[<column name>….])…..
);

18. How will assign a default value for the table field in a data base?

Ans. 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.

Example showing DEFAULT Constraint in the student table:

```
CREATE TABLE Student
(
Admno integer NOT NULL PRIMARY KEY,
Name char(20)NOT NULL,
Gender char(1),
Age integer DEFAULT = "17", → Default
                              Constraint
Place char(10),
);
```

19. Write the syntax of SELECT command for getting the desired result from the table.

Ans. The WHERE clause in the SELECT command specifies the criteria for getting the desired result. The general form of SELECT command with WHERE Clause is:

Syntax :

SELECT <column-name>[,<co umn-name> ,….] FROM <table-name>WHERE condition>;

20. How will you retain duplicate rows while displaying the table?

Ans. The ALL keyword retains duplicate rows. It will display every row of the table without considering duplicate entries.

SELECT ALL Place FROM Student;

21. Differentiate BETWEEN AND NOT BETWEEN keywords.

Ans.

BETWEEN	NOT BETWEEN
The BETWEEN keyword defines a range of values the record must fall into to make the condition true.	The NOT BETWEEN is reverse of the BETWEEN operator where the records not satisfying the condition are displayed.

22. Differentiate IN and NOT IN keywords.

Ans.

IN Keyword	NOT IN key-word
The IN keyword is used to specify a list of values which must be matched with the record values. In other words it is used to compare a column with more than one value. It is similar to an OR condition.	The NOT IN keyword displays only those records that do not match in the list.

23. How will search NULL values in a field? Give example.

Ans. The NULL value in a field can be searched in a table using the ISNULL in the WHERE clause. For example to list all the students whose Age contains no value, the command is used as:

SELECT * FROM Student WHERE Age IS NULL;

24. Write the syntax of ORDER by clause used in SELECT command.

Ans. The ORDER BY clause is used as :

SELECT <column-name>[,<columnname>,….] FROM <table-name>ORDER BY <column1>,< column2>,…ASC| DESC ;

25. What is the rule to apply DROP TABLE command?

Ans. The is a condition for dropping a table; is it must be an empty table.

26. How will you filter the records in a table? Give an example.

Ans. The WHERE clause is used to filter the records. It helps to extract only those records which satisfy a given condition. For example in the student table, to display the list of students of age18 and above in alphabetical order of their names, the command is given as below:

SELECT * FROM Student WHERE Age>=18 ORDER BY Name;

27. Write the syntax of GROUP BY and HAVING clause.

Ans. SELECT <column-names> FROM <table-name> GROUP BY <column-name>HAVING condition];

28. How will you include aggregate function on the group created in a table using GROUP BY clause?

Ans. The HAVING clause can be used along with GROUP BY clause in the SELECT statement to place condition on groups and can include aggregate functions on them. For example to count the number of Male and Female students belonging to Chennai .

SELECT Gender , count(*) FROM Student GROUP BY Gender HAVING Place = 'Chennai';

SHORT ANSWERS 3 MARKS

1. How the data in RDBMs is stored ? Explain.

Ans. **(i)** The data in RDBMS, is stored in database objects, called Tables. A table is a collection of related data entries and it consist of rows and columns.

(ii) A field is a column in a table that is designed to maintain specific related information about every record in the table. It is a vertical entity that contains all information associated with a specific field in a table. The fields in a student table may be of the type AdmnNo, StudName, StudAge, StudClass, Place etc.

(iii) A Record is a row, which is a collection of related fields or columns that exist in a table. A record is a horizontal entity in a table which represents the details of a particular student in a student table.

2. Define Data Control Language and also list the command under this.

Ans. **Data control language :** A Data Control Language (DCL) is a programming language used to control the access of data stored in a database. It is used for controlling privileges in the database (Authorization). The privileges are required for performing all the database operations such as creating sequences, views of tables etc.

SQL commands which come under Data Control Language are :

Grant	Grants permission to one or more users to perform specific tasks.
Revoke	Withdraws the access permission given by the GRANT statement.

3. Write the syntax for the following commands.

(i) INSERT (ii) DELETE

(iii) UPDATE

Ans. **(i) INSERT :**

INSERT INTO <table-name> [column-list] VALUES (values);

(ii) DELETE :

DELETE FROM table-name WHERE condition;

(iii) UPDATE :

UPDATE <table-name> SET column-name = value, column-name = value,… WHERE condition;

4. List the data types used in SQL.

Ans. **(i)** char (Character)

(ii) varchar

(iii) dec (Decimal)

(iv) numeric

(v) int (Integer)

(vi) smallint

(vii) float

(viii) real

(ix) double

5. How will you frame the commands to work on database?

Ans. The SQL provides a predetermined set of commands to work on databases.

Keywords	They have a special meaning in SQL. They are understood as instructions.
Commands	They are instructions given by the user to the database also known as statements.
Clauses	They begin with a keyword and consist of keyword and argument.
Arguments	They are the values given to make the clause complete.

6. How will set a primary key for more than one field? Explain with example.

Ans. **Table Constraint :** When the constraint is applied to a group of fields of the table, it is known as Table constraint. The table constraint is normally given at the end of the table definition. Let us take a new table namely Student1 with the following fields Admno, Firstname, Lastname, Gender, Age, Place:

```
Create Table Student 1
(
Admno integer                    NOT NULL,
Firstname char(20),
Lastname char(20),
Gender char(1),
Age integer,
Place char(10),
PRIMARY KEY (Firstname, Lastname) → Table
                                    constraint
);
```

In the above example, the two fields, Firstname and Lastname are defined as Primary key which is a Table constraint.

7. How will you generate queries and retrieve data from the table? Explain?

Ans. One of the most important tasks when working with SQL is to generate Queries and retrieve data. A Query is a command given to get a desired result from the database table. The **SELECT** command is used to query or retrieve data from a table in the database. It is used to retrieve a subset of records from one or more tables. The **SELECT** command can be used in various forms:

Syntax of **SELECT** command :

SELECT <column-list>FROM<table-name>;

(i) Table-name is the name of the table from which the information is retrieved.

(ii) Column-list includes one or more columns from which data is retrieved.

8. Which constraint helps to set a limit value placed for a field?

Ans. **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 showing check constraint in the student table:

```
CREATE TABLE Student
(
Admno integer NOT NULL PRIMARY KEY
Name char(20)NOT NULL,
Gender char(1),
Age integer (CHECK<=19), → Check Constraint
Place char(10),
);
```

In the above example the check constraint is set to Age field where the value of Age must be less than or equal to 19.

9. Write the different categories of SQL commands.

Ans.

(i)	DDL	- Data Definition Language
(ii)	DML	- Data Manipulation Language
(iii)	DCL	- Data Control Language
(iv)	TCL	- Transaction Control Language
(v)	DQL	- Data Query Language

LONG ANSWERS — 5 MARKS

1. Write the processing skills of SQL.

Ans. The various processing skills of SQL are :

(i) Data Definition Language (DDL) : The SQL DDL provides commands for defining relation schemas (structure), deleting relations, creating indexes and modifying relation schemas.

(ii) Data Manipulation Language (DML): The SQL DML includes commands to insert, delete, and modify tuples in the database.

(iii) Embedded Data Manipulation Language : The embedded form of SQL is used in high level programming languages.

(iv) View Definition : The SQL also includes commands for defining views of tables.

(v) Authorization : The SQL includes commands for access rights to relations and views of tables.

(vi) Integrity : The SQL provides forms for integrity checking using condition.

(vii) Transaction control : The SQL includes commands for file transactions and control over transaction processing.

2. Explain ALTER command in detail.

Ans. **ALTER Command :**

(i) 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. It is used in the following way :

(ii) ALTER TABLE <table-name> ADD <column-name><data type><size>;

(iii) To add a new column "Address" of type 'char' to the Student table, the command is used as

(iv) ALTER TABLE Student ADD Address char;

To modify existing column of table, the ALTER TABLE command can be used with MODIFY clause like wise:

(v) ALTER <table-name> MODIFY<column-name><data type><size>;

ALTER TABLE Student MODIFY Address char (25);

(vi) The above command will modify the address column of the Student table to now hold 25 characters.

(vii) The ALTER command can be used to rename an existing column in the following way :

(viii) ALTER <table-name> RENAME old-column- name TO new-column-name;

(ix) For example to rename the column Address to City, the command is used as :

(x) ALTER TABLE Student RENAME Address TO City;

(xi) The ALTER command can also be used to remove a column or all columns, for example to remove a particular column, the DROP COLUMN is used with the ALTER TABLE to remove a particular field, the command can be used as:

ALTER <table-name> DROP COLUMN <column-name>;

(xii) To remove the column City from the Student table, the command is used as :

ALTER TABLE Student DROP COLUMN City;

3. Write a note on

(i) TRUNCATE command.

(ii) DROP TABLE command.

Ans. **(i) TRUNCATE command :** The TRUNCATE command is used to delete all the rows from the table, the structure remains and the space is freed from the table. The syntax for TRUNCATE command is:

- **TRUNCATE TABLE table-name;**

For example to delete all the records of the student table and delete the table the SQL statement is given as follows:

- **TRUNCATE TABLE Student;**

The table Student is removed and the space is freed.

(ii) DROP TABLE command : The DROP TABLE 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. Once a table is dropped we cannot get it back, so be careful while using DROP TABLE command. But there is a condition for dropping a table; it must be an empty table.

Remove all the rows of the table using **DELETE** command. The **DELETE** command is already explained.

To delete all rows, the command is given as:

- **DELETE * FROM Student;**

Once all the rows are deleted, the table can be deleted by DROP TABLE command in the following way:

- **DROP TABLE table-name;**

For example to delete the Student table:

DROP TABLE Student;

☆☆☆

CHAPTER 13

PYTHON AND CSV FILES

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. **A CSV file is also known as a ….**
(a) Flat File (b) 3D File
(c) String File (d) Random File
[Ans. (a) Flat File]

2. **The expansion of CRLF is** *[Govt. MQP-2019]*
(a) Control Return and Line Feed
(b) Carriage Return and Form Feed
(c) Control Router and Line Feed
(d) Carriage Return and Line Feed
[Ans. (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
[Ans. (c) csv]

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
[Ans. (b) Binary mode]

5. **The command used to skip a row in a CSV file is**
(a) next() (b) skip()
(c) omit() (d) bounce()
[Ans. (a) next()]

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
[Ans. (a) Line Terminator]

7. **What is the output of the following program?**

```
import csv
d=csv.reader(open('c:\PYPRG\ch13\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
[Ans. (b) mumbai,andheri]

8. **Which of the following creates an object which maps data to a dictionary?** *[PTA-1]*
(a) listreader() (b) reader()
(c) tuplereader() (d) DictReader ()
[Ans. (d) DictReader ()]

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
[Ans. (c) Modification]

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

```
import csv
D = [['Exam'],['Quarterly'],['Halfyearly']]
csv.register_dialect('M',lineterminator = '\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 Quarterly Halfyearly
(c) E
Q
H
(d) Exam,
Quarterly,
Halfyearly
[Ans. (d) Exam, Quarterly, Halfyearly]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. **What is CSV File?** *[PTA-3]*

Ans. **(i)** A CSV file is a human readable text file where each line has a number of fields, separated by commas or some other delimiter.

(ii) A CSV file is also known as a Flat File that can be imported to and exported from programs that store data in tables, such as **Microsoft Excel or OpenOfficeCalc**.

2. Mention the two ways to read a CSV file using Python. *[PTA-2]*

Ans. There are two ways to read a CSV file.

(a) Use the csv module's reader function

(b) Use the DictReader class.

3. Mention the default modes of the File.

Ans. (i) The default is reading ('r') in text mode.

(ii) In this mode, while reading from the file the data would be in the format of **strings**.

4. What is use of next() function?

Ans. (i) **"next()" command** is used to avoid or skip the first row or row heading.

(ii) **Example :** While sorting the row heading is also get sorted, to avoid that the first is skipped using next().

(iii) Then the list is sorted and displayed.

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

Ans. To sort by more than one column you can use itemgetter with multiple indices.

operator .itemgetter (1,2).

Syntax :

```
sortedlist = sorted(data, key=operator.itemget
             ter(Col_number),reverse=True)
```

PART - III

ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. Write a note on open() function of python. What is the difference between the two methods? *[PTA-1; HY-2019]*

Ans. 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.

(i) The default is reading in text mode.

(ii) In this mode, while reading from the file the data would be in the format of **strings**.

(iii) On the other hand, binary mode returns bytes and this is the mode to be used when dealing with non-text files like image or exe files.

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

Ans.

```
import csv
row = ['3', 'Meena','Bangalore']
with open('student.csv', 'r') as readFile:
reader = csv.reader(readFile)
lines = list(reader)          # list()- to store each
                                row of data as a list
lines[3] = row
with open('student.csv', 'w') as writeFile:
# returns the writer object which converts the user
                                data with delimiter
writer = csv.writer(writeFile)
#writerows()method writes multiple rows to a csv
                                file
writer.writerows(lines)
readFile.close()
writeFile.close()
```

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

Ans.

```
#import csv
import csv  #opening the csv file which is in
              different location with read mode
with open('c:\\pyprg\\sample1.csv','r') as F:
            #other way to open the file is f=('c:\\
              pyprg\\sample1.csv','r')
reader = csv.reader(F)
            #printing each line of the Data row
              by row
print(row)
F.close()
```

Output :

['SNO', 'NAME', 'CITY']

['12101', 'RAM', 'CHENNAI']

['12102', 'LAVANYA', 'TIRUCHY']

[12103', 'LAKSHMAN', 'MADURAI']

4. What is the difference between the write mode and append mode. *[PTA-2, 5]*

Ans. The 'w' write mode creates a new file. If the file is already existing 'w' mode overwrites it. Where as 'a' append mode is used to add the data at the end of the file if the file already exists otherwise creates a new one.

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

Ans. **Reader():**

(i) The reader function is designed to take each line of the file and make a list of all columns.

(ii) Using this method one can read data from csv files of different formats like quotes (" "), pipe (|) and comma (,).

(iii) csv. Reader work with list/tuple.

(iv) **Syntax:** csv.reader(fileobject,delimiter, fmtparams)

DictReaer() :

(i) DictReader works by reading the first line of the CSV and using each comma separated value in this line as a dictionary key.

(ii) DictReader is a class of csv module is used to read a CSV file into a dictionary.

(iii) It creates an object which maps data to a dictionary.

(iv) csv.DictReader work with dictionary.

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

1. Differentiate Excel file and CSV file. *[PTA-2]*

Ans.

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 viz. xls or xlsx	CSV is a format for saving tabular information into a 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

2. Tabulate the different mode with its meaning.

Ans.

Mode	Description
'r'	Open a file for reading. (default)
'w'	Open a file for writing. Creates a new file if it does not exist or truncates the file if it exists.
'x'	Open a file for exclusive creation. If the file already exists, the operation fails.
'a'	Open for appending at the end of the file without truncating it. Creates a new file if it does not exist.
't'	Opren in text mode. (default)
'b'	Open in binary mode.
'+'	Open a file for updating (reading and writing)

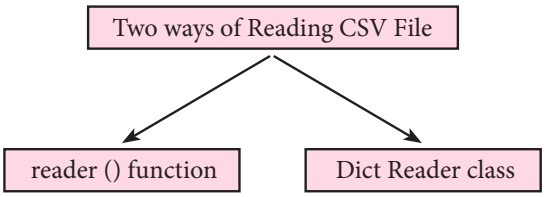
3. Write the different methods to read a File in Python.

Ans. **Read a CSV File Using Python :**

There are two ways to read a CSV file.

(i) Use the csv module's reader function

(ii) Use the DictReader class.



CSV Module's Reader Function :

(i) 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.

(ii) Then, you just choose the column you want the variable data for. Using this method one can read data from csv files of different formats like quotes (" "), pipe (|) and comma (,).

The syntax for csv.reader() is

csv.reader(fileobject,delimiter,fmtparams)

where

(iii) **file object :** passes the path and the mode of the file

(iv) **delimiter:** an optional parameter containing the standard dilects like , | etc can be omitted.

(v) **fmtparams :** optional parameter which help to override the default values of the dialects like skipinitialspace,quoting etc. can be omitted.

- CSV file - data with default delimiter comma (,)
- CSV file - data with Space at the beginning
- CSV file - data with quotes
- CSV file - data with custom Delimiters

CSV file with default delimiter comma (,): The following program read a file called "sample1. csv" with default delimiter comma (,) and print row by row.

Program :

```
#importing csv
import csv
#opening the csv file which is in different location with read mode
with open('c:\\pyprg\\sample1.csv', 'r') as F:
#other way to open the file is f= ('c:\\pyprg\\sample1.csv', 'r')
reader = csv.reader(F)
# printing each line of the Data row by row
    print(row)
F.close()
```

Output :

```
['SNO', 'NAME', 'CITY']
['12101', 'RAM', 'CHENNAI']
['12102', 'LAVANYA', 'TIRUCHY']
['12103', 'LAKSHMAN', 'MADURAI']
```

CSV files - data with Spaces at the beginning

Consider the following file "sample2.csv" containing the following data when opened through notepad

Topic1,	Topic2,	Topic3,
one,	two,	three
Example1,	Example2,	Example3

The following program read the file through Python using "csv,reader()".

```
import csv
csv.register_dialect('myDialect',delimiter = ',', skipinitialspace=True)
F=open('c:\\pyprg\\sample2.csv','r')
reader = csv.reader(F, dialect='myDialect')
for row in reader:
print(row)
F.close()
```

OUTPUT :

```
['Topic1', 'Topic2', 'Topic3']
['one', 'two', 'three']
['Example1', 'Example2', 'Example3']
```

(i) These whitespaces in the data can be removed, by registering new dialects using **csv.register_dialect()** class of csv module.

(ii) A dialect describes the format of the csv file that is to be read.

(iii) In dialects the parameter **"skipinitialspace"** is used for removing whitespaces after the delimiter.

CSV File-Data With Quotes :

(i) You can read the csv file with quotes, by registering new dialects using csv.register_dialect() class of csv module.

(ii) Here, we have quotes.csv file with following data.

SNO, Quotes

1, "The secret to getting ahead is getting started".

2, "Excellence is a continuous process and not an accident."

The following Program read "quotes.csv" file, where delimiter is comma (,) bUt the quotes are within quotes (" ").

```
import csv
csv.register_dialect('myDialect',delimiter = ',',
                     quoting=csv.QUOTE_ALL,
skipinitialspace=True)
f=open('c:\\pyprg\\quotes.csv','r')
reader = csv.reader(f, dialect='myDialect')
for row in reader:
print(row)
```

OUTPUT :

```
['1', 'The secret to getting ahead is getting
                                    started.']
['2', 'Excellence is a continuous process and not
                                    an accident.']
```

(i) In the above program, register a dialect with name myDialect.

(ii) Then, we used csv. QUOTE_ALL to display all the characters after double quotes.

CSV files with Custom Delimiters :

(i) You can read CSV file having custom delimiter by registering a new dialect with the help of csv.register_dialect().

Roll No	Name	City
12101	Arun	Chennai
12102	Meena	Kovai
12103	Ram	Nellai
103	Ayush	M
104	Abinandh	M

(ii) In the following file called "sample4.csv", each column is separated with | (Pipe symbol)

```
import csv
csv.register_dialect('myDialect', delimiter = '|')
with open('c:\\pyprg\\sample4.csv', 'r') as f:
    reader = csv.reader(f, dialect='myDialect')
    for row in reader:
        print(row)
f.close()
```

OUTPUT :

```
['RollNo', 'Name', 'City']
['12101', 'Arun', 'Chennai']
['12102', 'Meena', 'Kovai']
['12103', 'Ram', 'Nellai']
```

4. Write a Python program to write a CSV File with custom quotes.

Ans.

```
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',quoting=csv.
                                    QUOTE_ALL)
```

```
with open('c:\\pyprg\\ch13\\person.csv', 'w') as f:
    writer = csv.writer(f, dialect='myDialect')
    for row in info:
    writer.writerow(row)
f.close()
```

OUTPUT :

"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"

5. Write the rules to be followed to format the data in a CSV file. *[PTA-5]*

Ans. **Rules to be followed to format data in a CSV file :**

(i) Each record (row of data) is to be located on a separate line, delimited by a line break by pressing enter key.

Example: ↵

xxx,yyy↵

↵ denotes enter Key to be pressed

(ii) The last record in the file may or may not have an ending line break.

Example:

ppp, qqq↵

yyy, xxx

(iii) 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.

Example:

field_name1,field_name2,field_name3↵

aaa,bbb,ccc↵

zzz,yyy,xxx CRLF(Carriage Return and Line Feed)

(iv) 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. For example: Red , Blue

(v) 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.

Example:

"Red","Blue","Green"↵ #Field data with double quotes

Black,White,Yellow #Field data without double quotes

(vi) Fields containing line breaks (CRLF), double quotes, and commas should be enclosed in double-quotes.

Example:

Red, "", Blue CRLF # comma itself is a field value.so it is enclosed with double quotes

Red, Blue , Green

(vii) If double-quotes are used to enclose fields, then a double-quote appearing inside a field must be preceded with another double quote.

Example:

"Red, " "Blue", "Green", # since double quotes is a field value it is enclosed with another double quotes , , White

HANDS ON EXPERIENCE

1. Write a Python program to read the following Namelist.csv file and sort the data in alphabetically order of names in a list and display the output.

	A	B	C
1	SNO	NAME	OCCUPATION
2	1	NIVETHITHA	ENGINEER
3	2	ADHITH	DOCTOR
4	3	LAVANYA	SINGER
5	4	VIDHYA	TEACHER
6	5	BINDHU	LECTURER

Ans.

```
import csv,operator
data = csv.reader(open('c:\\PYPRG\\NameList.csv'))
next(data)
sorted list = sorted(data, key = operator.itemgetter(1))
for row in sorted list:
    print(row)
```

Output :

2	Adhith	Doctor
5	Bindhu	Lecturer
3	Lavanya	Singer
1	Nivethitha	Engineer
4	Vidhya	Teacher

2. Write a Python program to accept the name and five subjects mark of 5 students .Find the total and store all the details of the students in a CSV file.

Ans.
```
import csv
csvData = [['student',
                'm1','m2','m3','m4','m5','total'],
        ['Ram', '90','90','90','90','90','450'],
        ['Hari', '100','100','100','10','90','490'],
        ['Sai', '90','90','100','100','100','480'],
        ['Viji', '100','90','90','90','100','470']
        ['Raja', '80','80','80','100','100','440']]
with open('c:\\pyprg\\ch13\\st.csv','w')as CF:
writer = csv.writer(CF)
writer.writerows(csvData)
CF.close()
```

Output :

Student	m1	m2	m3	m4	m5	Total
Ram	90	90	90	90	90	450
Hari	100	100	100	100	90	490
Sai	90	90	100	100	100	480
Viji	100	90	90	90	100	470
Raja	80	80	80	100	100	440

PTA Questions and Answers

1 MARK

1. The file extension of Excel: *[PTA-2]*

(a) exl (b) xls (c) cel (d) Ecl

[Ans. (b) xls]

2. The python file mode opens a file for exclusive creation: *[PTA-3]*

(a) w (b) x (c) b (d) a

[Ans. (b) x]

3. In csv.register_dialect(), Which of the following parameter is used for removing whitespaces? *[PTA-4]*

(a) removespace (b) skipinitialspace

(c) skipspace

(d) removeinitialspace

[Ans. (b) skipinitialspace]

4. To read a CSV file into a dictionary can be done by using _____. *[PTA-5]*

(a) Reader (b) DictReader

(c) CSVReader (d) FileReader

[Ans. (b) DictReader]

2 MARKS

1. What is Excel? *[PTA-6]*

Ans. Excel is a binary file that holds information about all the worksheets in a file, including both content and formatting.

3 MARKS

1. How csv.write() function is used to create a normal CSV file in Python? *[PTA-4]*

Ans. The csv.writer() method returns a writer object which converts the user's data into delimited strings on the given file-like object. The writerow() method writes a row of data into the specified file.

The syntax for csv.writer() is

csv.writer(fileobject,delimiter,fmtparams)

where

fileobject : passes the path and the mode of the file

delimiter : an optional parameter containing the standard dilects like , | etc can be omitted

fmtparams : optional parameter which help to override the default values of the dialects like skipinitialspace,quoting etc. can be omitted

You can create a normal CSV file using writer() method of csv module having default delimiter comma (,)

Here's an example.

The following Python program converts a List of data to a CSV file called "Pupil.csv" that uses, (comma) as a value separator.

Government Exam Questions and Answers

2 MARKS

1. How the CSV file operation takes place in python?

(or)

What are the steps involved in file operation of Python? *[Govt. MQP-2019]*

Ans. Python, a file operation takes place in the following order

Step 1 : Open a file

Step 2 : Perform Read or write operation

Step 3 : Close the file

Additional Questions and Answers

Choose the Correct Answer 1 MARK

1. Which of the following gives the python programmer the ability to parse CSV files?

(a) CSV data (b) CSV module
(c) CSV sheet (d) CSV flat file

[Ans. (b) CSV module]

2. CSV means

(a) Condition separated values
(b) Colon separated values
(c) C++ solution values
(d) Comma separated values

[Ans. (d) Comma separated values]

3. Which of the following is a human readable text file where each line has fields?

(a) CSV file
(b) CSV module
(c) CSV sheet
(d) CSV text **[Ans. (a) CSV file]**

4. Which of the following can protect if the data itself contains commas in CSV file?

(a) ‘ ‘ (b) , , (c) “ “ (d) :

[Ans. (c) “ “]

5. In CSV file, each record is to be located on a separate line, delimited by a line break by pressing

(a) Enter key (b) ESV key
(c) Tab key (d) Shift key

[Ans. (a) Enter key]

6. Fields containing line breaks denoted by

(a) CSV (b) XLS
(c) CLRF (d) CRLF

[Ans. (d) CRLF]

7. In Excel, the default CSV files should open automatically by

(a) Single click (b) Right click
(c) Double click (d) None of these

[Ans. (c) Double click]

8. How many ways to read a CSV file?

(a) 2 (b) 3
(c) 4 (d) Only one

[Ans. (a) 2]

9. Which of the following is way to read a CSV file?

(a) read () (b) reader ()
(c) dictreader () (d) b and c

[Ans. (d) b and c]

10. How many steps are there to do CSV file operations using python?

(a) 2 (b) 3 (c) 4 (d) 5

[Ans. (b) 3]

11. Which of the following built-in function Python has to open a file?

(a) read () (b) open ()
(c) reader () (d) openfile ()

[Ans. (b) open ()]

12. Python function open () returns a file object called
(a) read (b) write
(c) handle (d) process
[Ans. (c) handle]

13. How many modes can be specified while opening a CSV file?
(a) 2 (b) 4
(c) 3 (d) None of these
[Ans. (c) 3]

14. Which of the following is not a mode used while opening a file?
(a) p (b) w (c) r (d) a
[Ans. (a) p]

15. CSV file can be opened in
(a) Text mode (b) Binary mode
(c) Application mode (d) a or b
[Ans. (d) a or b]

16. Which mode can be used when CSV files dealing with non-text files?
(a) Read mode (b) Binary mode
(c) Process mode (d) Write mode
[Ans. (b) Binary mode]

17. While reading CSV file in text mode, the data would be in the format
(a) numbers (b) characters
(c) strings (d) float
[Ans. (c) strings]

18. Which file mode creates a new file if does not exist?
(a) 'n' (b) 'r' (c) 'w' (d) 'x'
[Ans. (c) 'w']

19. The statement f = open ("sample.txt") equivalent to the mode
(a) r (b) x
(c) x or a (d) r or r +
[Ans. (d) r or r +]

20. The default file open mode is
(a) rt (b) x (c) a (d) r
[Ans. (a) rt]

21. The CSV file contents can be read with the help of the method
(a) read ( ) (b) open ( )
(c) with open ( ) (d) reader ( )
[Ans. (d) reader ( )]

22. Which of the following function is designed to take each line of the file and make a list of all columns?
(a) read ( ) (b) reader ( )
(c) column ( ) (d) list ( )
[Ans. (b) reader ( )]

23. Which of the following format(s) the CSV files data can be read?
(a) Quotes (b) Pipe
(c) Comma (d) all of these
[Ans. (d) all of these]

24. How many formats in which CSV file data can be read?
(a) 3 (b) 2 (c) 4 (d) 5
[Ans. (a) 3]

25. Which of the following is not a format in which CSV file data can be read?
(a) Quotes (b) Pipe
(c) Semi colon (d) Comma
[Ans. (c) Semi colon]

26. Which of the following describes the format of the CSV file that is to be read?
(a) parameter (b) dialect
(c) whitespace (d) delimeter
[Ans. (b) dialect]

27. Which of the following allows to create, store and re-use various formatting parameters for CSV file data?
(a) class (b) dialect
(c) object (d) none of these
[Ans. (b) dialect]

28. The function used to add elements to CSV file is
(a) add ( ) (b) write ( )
(c) append ( ) (d) addition ( )
[Ans. (c) append ( )]

29. List literals are enclosed with
(a) { } (b) ( ) (c) < > (d) [ ]
[Ans. (d) [ ]]

30. In a CSV file, first row should be skipped while sorting, the function used is
(a) readonly ( ) (b) readnext ( )
(c) next ( ) (d) nextrow
[Ans. (c) next ( )]

31. In CSV file, if more than one column can be sorted using
(a) sorter ( ) (b) multisort ( )
(c) itemgetter ( ) (d) morecolumns ( )
[Ans. (c) itemgetter ( )]

32. CSV. reader ( ) works with the following
(a) list tuble (b) set
(c) dictionary (d) b or c
[Ans. (a) list tube]

33. CSV dictreader ( ) works with
(a) list (b) tuple
(c) set (d) dictionary
[Ans. (d) dictionary]

34. Which of the following works with list / tupledict?
(a) read ( ) (b) dictreader ( )
(c) reader ( ) (d) dict ( )
[Ans. (c) reader ( )]

35. Which of the following works with dictionary?
(a) reader ( ) (b) dictreader ( )
(c) read ( ) (d) dictionary ( )
[Ans. (b) dictreader ( )]

36. How many ways are there to write a new or modify the existing CSV file?
(a) 8 (b) 6 (c) 4 (d) 2
[Ans. (a) 8]

37. Which method returns a writer object which converts the user's data into delimited strings on the given file-like object?
(a) csv.write row ( ) (b) csv.write user ( )
(c) csv.writer ( ) (d) csv.write ( )
[Ans. (c) csv.writer ( )]

38. Which method writes a row of data into the specified CSV file?
(a) row ( ) (b) writerow ( )
(c) rowdata ( ) (d) rowwrite ( )
[Ans. (b) writerow ( )]

39. How many rows at a time the writerrow( ) method writes in a CSV file?
(a) 1 (b) 2
(c) 3 (d) many
[Ans. (a) 1]

40. Which of the following class of CSV file module is used to write CSV file with quotes by registering new dialects?
(a) csv.register ( ) (b) csv.dialect ( )
(c) csv.dialect_register ( )
(d) csv.register_dialect ( )
[Ans. (d) csv.register_dialect ( )]

41. Which option allows to write the double quote or all the values in CSV file?
(a) csv.Quote ( )
(b) csv.ALL_QUOTE()
(c) csv.QUOTE_ALL ( )
(d) csv.QUOTEALL ( )
[Ans. (c) csv.QUOTE_ALL ( )]

42. The default value of dialect parameter skipinitialspace is
(a) True (b) false
(c) on (d) off
[Ans. (b) false]

43. The default line terminator is
(a) \r (b) \n
(c) \b (d) a or b
[Ans. (d) a or b]

44. **Which of the following delimiter is considered as a column separator?**

(a) ¦ (b) , (c) : (d) —

[Ans. (a) ¦]

45. **Which method is used to write all the data at once?**

(a) write (b) writer ( )
(c) writerow ( ) (d) allrow ( )

[Ans. (c) writerow ( )]

46. **Which of the following function takes additional argument filed names that are used as dictionary keys fields?**

(i) csv.DictReader ( )
(ii) csv.Dicwriter ( )
(iii) reader ( ) iv. writer ( )

(a) i and iii (b) i and ii
(c) iii and iv (d) only iii

[Ans. (b) i and ii]

47. **Which function is used to print the data in dictionary format without order?**

(a) dict ( ) (b) dictionary ( )
(c) readdict ( ) (d) printdict ( )

[Ans. (a) dict ( )]

48. **By default CSV files should open automatically in**

(a) OpenOffice (b) Python
(c) Excel (d) Text Editor

[Ans. (c) Excel]

49. **Which method will free up the resources that were tied with the file?**

(a) free ( ) (b) open ( )
(c) resources ( ) (d) close ( )

[Ans. (d) close ( )]

CHOOSE AND FILL IN THE BLANKS

1. **Files saved in _____ can be opened or edited by text editors.**

(a) Excel (b) Worksheet
(c) CSV (d) Python

[Ans. (c) CSV]

2. **_____ files are saved with extension.*xlsx*.**

(a) Excel (b) CSV
(c) Wordpad (d) Notepad

[Ans. (a) Excel]

3. **_____ file cannot store charts or graphs.**

(a) Excel (b) MsWord
(c) CSV (d) Openoffice calc

[Ans. (c) CSV]

4. **_____ the extension of CSV file is**

(a) .CV (b) .CSV
(c) .CVS (d) .CS

[Ans. (b) .CSV]

5. **____ provides a module named CSV, using this several operations on the CSV file can be done.**

(a) Ms-Excel (b) Python
(c) Text editor (d) Openoffice calc

[Ans. (b) Python]

6. **_____ files have been used extensively in e-commerce.**

(a) Ms-Excel
(b) Open - Open of file calc
(c) Python
(d) CSV files **[Ans. (d) CSV files]**

7. **CSV file name _____ can be represented in the open command using**

(a) " " (b) ' '
(c) "" "" (d) a or b

[Ans. (d) a or b]

8. **CSV files opened in binary mode returns _____**

(a) bits (b) Mbs
(c) bytes (d) GBs

[Ans. (c) bytes]

9. **The default mode in which CSV file are opened is_____**

(a) Binary mode (b) Text mode
(c) Process mode (d) Write mode

[Ans. (b) Text mode]

10. In_____ mode, CSV file data format is strings.

(a) read mode (b) write mode
(c) process mode (d) text mode

[Ans. (d) text mode]

11. _____ has a garbage collector to clean up unreferenced objects.

(a) CSV (b) Excel
(c) Python (d) Open office

[Ans. (c) Python]

12. _____ command arranges a CSV file list value in ascending order.

(a) listname.sort ( )
(b) listname.ascd ( )
(c) listname.asc ( )
(d) sorting ( ) **[Ans. (a) listname.sort ( )]**

13. _____ takes 1-dimensional data, and 2-dimensional to write in a file

(a) write (b) writerow ( )
(c) row ( ) (d) wrow ( )

[Ans. (b) writerow ( )]

14. A _____ is a string used to terminate lines produced by writer ( )

(a) Line
(b) Custom Delimiters
(c) Line Terminator
(d) Quotes **[Ans. (c) Line Terminator]**

15. The _____ method sorts the elements of a given item in a specific order as same as sort ( ).

(a) reverse sort ( ) (b) sort reverse ( )
(c) sorting ( ) (d) sorter ( )

[Ans. (d) sorter ( )]

16. Python's CSV module only accepts _____ as line terminator.

(a) \r (b) \n
(c) \a (d) \r or \n

[Ans. (d) \r or \n]

17. To sort by more than one column _____ with multiple indices is used.

(a) sort (b) itemgetter ( )
(c) sorter ( ) (d) more item ( )

[Ans. (b) itemgetter ( )]

Very Short Answers 2 MARKS

1. **Why CSV file is known as flat file?**

Ans. A CSV is known as flat file because files in the CSV format can be imported to and exported from programs that store data in tables, such as *Microsoft Excel or OpenOfficeCalc*

2. **What is the use of CSV file?**

Ans. CSV is a simple **file format** used to store tabular data, such as a spreadsheet or database. Since they're plain text, they're easier to import into a spreadsheet or another storage database, regardless of the specific software

3. **How will prefect the CSV File data contains common by itself?**

Ans. If the fields of data in your CSV file contain commas, you can protect them by enclosing those data fields in double-quotes (“). The commas that are part of your data will then be kept separate from the commas which delimit the fields themselves.

4. **Expand (i) CSV, (ii) CRLF**

Ans. **(i)** Comma separated values
(ii) Carriage Return line feed

5. **How the CSV filename represented in open command?**

Ans. File name or the complete path name can be represented either with in “ “ or in ‘ ‘ in the open command.

6. **What take the three models in which CSV file can be opened ?**

Ans. Read 'r', write 'w' or append 'a'.

7. Differentiate text mode and binary mode.

Ans.

	Text mode	Binary mode
(i)	The default is reading in text mode.	Binary mode returns bytes.
(ii)	In this mode, while reading from the file the data would be in the format of strings.	This is the mode to be used when dealing with non-text files like image or exe files.

8. Why python has a garbage collector?

Ans. Python has a garbage collector to clean up unreferenced objects but, the user must not rely on it to close the file.

9. What is the purpose of using 'with' statement along with open()?

Ans. If an **exception** occurs when you are performing some operation with the file, the code exits without closing the file. The best way to do this is using the "**with**" statement. This ensures that the file is closed when the block inside **with** is exited.

10. What is the use of close() method?

Ans. Closing a file will free up the resources that were tied with the file and is done using Python close() method.

11. Write a note an reader().

Ans. (i) To 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.

(ii) Then, you just choose the column you want the variable data for. Using this method one can read data from csv files of different formats like quotes (" "), pipe (|) and comma (,).

12. Write a note is register dialect() method?

Ans. (i) The whitespaces can be removed, by registering new dialects using csv.register_dialect() class of csv module.

(ii) A dialect describes the format of the csv file that is to be read. In dialects the parameter "skipinitialspace" is used for removing whitespaces after the delimiter.

13. What is dialect?

Ans. A dialect is a class of csv module which helps to define parameters for reading and writing CSV. It allows to create, store, and re-use various formatting parameters for data.

14. What is list?

Ans. A list is a data structure in Python that is a mutable, or changeable, ordered sequence of elements.

15. What is use of sort() method?

Ans. sort() command arranges a list value in ascending order. list_name.sort(reverse) is used to arrange a list in descending order.

16. Differentiate sort() and sorted().

Ans. (i) The sorted() method sorts the elements of a given item in a specific order – ascending or descending. sort() method performs the same way as sorted().

(ii) Only difference, sort() method doesn't return any value and changes the original list itself.

17. How will you read CSV file into a dictionary?

Ans. (i) To read a CSV file into a dictionary can be done by using DictReader class of csv module which works similar to the reader() class but creates an object which maps data to a dictionary.

(ii) The keys are given by the fieldnames as parameter.

18. How Dict Reader works or What is the use of dictionary key?

Ans. (i) DictReader works by reading the first line of the CSV and using each comma separated value in this line as a dictionary key.

(ii) The columns in each subsequent row then behave like dictionary values and can be accessed with the appropriate key.

19. What is the use of dict()?

Ans. The function dict() is used to print the data in dictionary format without order.

20. What is an Ordered Dict?

Ans. DictReader() gives OrderedDict by default in its output. An OrderedDict is a dictionary subclass which saves the order in which its contents are added. To remove the OrderedDict use dict().

21. Differentiate writer() and writerow()method.

Ans.

writer()	writerow()
The csv.writer() method returns a writer object which converts the user's data into delimited strings on the given file-like object.	The writerow() method writes a row of data into the specified file.

22. What is called modification?

Ans. Making some changes in the data of the existing file or adding more data is called modification.

23. Write a program to add new rows in the existing CSV file?

Ans.
```
import csv
row = ['6', 'Sajini ', 'Madurai']
with open('student.csv', 'a') as CF:
    # append mode to add data at the end
writer = csv.writer(CF)
writer.writerow(row)
    # writerow() method write a single row of
                                    data in file
CF.close()
```

24. Write is purpose of using skipinitialspace parameter.

Ans. The dialect parameter skipinitialspace when it is True, whitespace immediately following the delimiter is ignored. The default is False.

25. Write a note an Line Terminator.

Ans. A Line Terminator is a string used to terminate lines produced by writer. The default value is \r or \n. We can write csv file with a line terminator in Python by registering new dialects using csv. register_dialect() class of csv module.

26. What are the line terminator accepted by python CSV module?

Ans. \r and \n are the line terminator accepted by Python CSV module.

27. What are used a dictionary keys?

Ans. csv.DictReader and csv.DictWriter take additional argument fieldnames that are used as dictionary keys.

SHORT ANSWERS 3 MARKS

1. How will you create CSV normal file?

Ans. To create a CSV file in Notepad,

(i) First open a new file using
File →New or ctrl +N.

(ii) Then enter the data separating each value with a comma and each row with a new line.

(iii) For example consider the following details

Topic1, Topic2, Topic3

one, two, three

Example1, Example2, Example3

(iv) Save this content in a file with the extension .csv.

2. How will you save the CSV file in MS-Excel?

Ans. To create a CSV file using Microsoft Excel, launch Excel and then open the file you want to save in CSV format. For example, below is the data contained in our sample Excel worksheet:

	A	B	C	D	E	F	G
1	Item Name	Cost - Rs	Quantity	Profit			
2	Keyboard	480	12	1152			
3		5200	10	10400			
4		200	50	2000			
5			Total Prof	13552			
6							
7							

Sample Worksheet Data

Once the data is entered in the worksheet, select File → Save As option, and for the "Save as type option", select CSV (Comma delimited) or type the file name along with extension .csv.

3. Write the syntax of reader().

Ans. The syntax for csv.reader() is

csv.reader(fileobject,delimiter,fmtparams)

where

(i) **file object :** passes the path and the mode of the file.

(ii) **delimiter :** an optional parameter containing the standard dilects like , | etc can be omitted

(iii) **fmtparams :** optional parameter which help to override the default values of the dialects like skipinitialspace,quoting etc. Can be omitted.

4. Write a program to read a file with default delimiter comma.

Ans.
```
#importing csv
import csv
#opening the csv file which is in different location with read mode
with open('c:\\pyprg\\sample1.csv', 'r') as F:
#other way to open the file is f= ('c:\\pyprg\\sample1.csv', 'r')
reader = csv.reader(F)
# printing each line of the Data row by row
    print(row)
F.close()
```

5. What are the different ways of reading a CSV file using reader() method?

Ans.

(i) CSV file - data with default delimiter comma (,)

(ii) CSV file - data with Space at the beginning

(iii) CSV file - data with quotes

(iv) CSV file - data with quotes

6. What are the ways to write a new or edit are existing CSV file in python?

Ans.

(i) Creating A New Normal CSV File

(ii) Modifying An Existing File

(iii) Writing on a CSV File with Quotes

(iv) Writing on a CSV File with Custom Delimiters

(v) Writing on a CSV File with Lineterminator

(vi) Writing on a CSV File with Quotechars

(vii) Writing CSV File Into A Dictionary

(viii) Getting Data At Runtime And Writing In a File

7. Write a program to create a new normal CSV file to store data.

Ans.
```
Import csv
csvData = [['Student', 'Age'], ['Dhanush', '17'], ['Kalyani', '18'], ['Ram', '15']]
with open('c:\\pyprg\\ch13\\Pupil.csv', 'w') as CF:
writer = csv.writer(CF)       # CF is the file object
writer.writerows(csvData) # csvData is the List name
CF.close()
```

Long Answers 5 MARKS

1. Write a program to read the CSV file through python using reader () method.

Ans.
```
import csv
csv.register_dialect('myDialect',delimiter = ',',skipinitialspace=True)
F=open('c:\\pyprg\\sample2.csv','r')
reader = csv.reader(F, dialect='myDialect')
for row in reader:
    print(row)
F.close()
```

2. Write a program to read the CSV file which contains spaces after the delimiter.

Ans.
```
import csv
csv.register_dialect('myDialect',delimiter = ',',skipinitialspace=True)
F=open('c:\\pyprg\\sample2.csv','r')
reader = csv.reader(F, dialect='myDialect')
for row in reader:
    print(row)
F.close()
```

3. Write a program to read the CSV file with user defined delimiter.

Ans.
```
Import csv
csv.register_dialect('myDialect', delimiter = '|')
with open('c:\\pyprg\\sample4.csv', 'r') as f:
    reader = csv,reader(f, dialect='myDialect')
    for row in reader:
        print(row)
f.close()
```

4. Write a program to read a specific column in a CSV file.

Ans.

```
Import csv
#opening the csv file which is in different location with read mode
f=open("c:\\pyprg\\ch 13sample5.csv",'r')
#reading the File with the help of csv.reader()
readFile=csv.reader(f)
#printing the selected column
for col in readFile :
    print col[0],col[3]
f.close()
```

Sample5.csv File in Excel

5. Write a program to read the CSV file and store it in a list.

Ans.

```
import csv
# other way of declaring the filename
inFile= 'c:\\pyprg\\sample.csv'
F=open(inFile,'r')
reader = csv.reader(F)
# declaring array
    arrayValue = []
# displaying the content of the list
for row in reader:
    arrayValue.append(row)
    print(row)
F.close()
```

6. Write a program to read the CSV file and store A column value in A list for sorting.

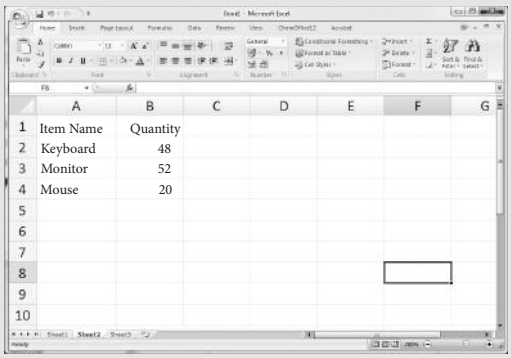
Ans.

```
# sort a selected column given by user leaving the header column
import csv
# other way of declaring the filename
inFile= 'c:\\pyprg\\sample6.csv'
# opening the csv file which is in the same location of this
python file
F=open(inFile,'r')
# reading the File with the help of csv.reader()
reader = csv.reader(F)
# skipping the first row(heading)
next(reader)
# declaring a list
arrayValue = []
a = int(input ("Enter the column number 1 to 3:-"))
# sorting a particular column-cost
for row in reader:
arrayValue.append(row[a])
arrayValue.sort()
for row in arrayValue:
    print (row)
F.close()
```

7. How will you sort more than one column in a CSV file? Explain with an example.

Ans. To sort by more than one column you can use itemgetter with multiple indices: operator. itemgetter (1,2).

sample8.csv in Excel screen



	A	B
1	Item Name	Quantity
2	Keyboard	48
3	Monitor	52
4	Mouse	20

sample8.csv in Notepad

```
ItemName ,Quantity
Keyboard, 48
Monitor,52
Mouse ,20
```

CSV file Data into a list for sorting

The following program do the task mentioned above using **operator.itemgetter(col_no)**

Example :

```
# Program to sort the entire row by using a specified column.
# declaring multiple header files
import csv ,operator
#One more way to read the file
data = csv.reader(open('c:\\PYPRG\\sample8. csv'))
next(data)          #(to omit the header)
```

```
#using operator module for sorting multiple columns
sortedlist = sorted (data, key=operator.itemgetter(1)) # 1 specifies we want to sort
    # according to second column
for row in sortedlist:
    print(row)
```

Output :

```
['Mouse ', '20']
['Keyboard ', '48']
['Monitor', '52']
```

8. Write a program to read CSV file with user Defined Delimiter into a Dictionary.

Ans.

```
import csv
csv.register_dialect('myDialect',delimiter = '|',skipinitialspace=True)
filename = 'c:\\pyprg\\ch13\\sample8.csv'
with open(filename, 'r') as csvfile:
    reader = csv.DictReader(csvfile, dialect='myDialect')
    for row in reader:
    print(dict(row))
csvfile.close()
```

9. Write a program to read CSV file with a line Terminator.

Ans.

```
import csv
Data = [['Fruit', 'Quantity'], ['Apple', '5'], ['Banana', '7'], ['Mango', '8']]
csv.register_dialect('myDialect', delimiter = '|', lineterminator = '\n')
with open('c:\\pyprg\\ch13\\line.csv', 'w') as f:
    writer = csv.writer(f, dialect='myDialect')
    writer.writerows(Data)
f.close()
```

10. How will you write the CSV file with custom denote characters? Explain with an example.

Ans. To write the CSV file with custom quote characters, by registering new dialects using csv. register_dialect() class of csv module.

Example :

```
import csv
csvData = [['SNO','Items'], ['1','Pen'], ['2','Book'], ['3','Pencil']]
csv.register_dialect('myDialect',delimiter = '|',
    quotechar = '"', quoting=csv.QUOTE_ALL)
with open('c:\\pyprg\\ch13\\quote.csv', 'w') as csvFile:
    writer = csv.writer(csvFile, dialect='myDialect')
writer.writerows(csvData)
print("writing completed")
csvFile.close()
```

11. How will you write Dictionary into CSV file with custom dialects?

Ans.

```
import csv
csv.register_dialect('myDialect', delimiter = '|', quoting=csv.QUOTE_ALL)
with open('c:\\pyprg\\ch13\\grade.csv', 'w') as csvfile:
    fieldnames = ['Name', 'Grade']
    writer = csv.DictWriter(csvfile, fieldnames=fieldnames, dialect ="myDialect")
    writer.writeheader()
    writer.writerows([{'Grade': 'B', 'Name': 'Anu'},
        {'Grade': 'A', 'Name': 'Beena'},
        {'Grade': 'C', 'Name': 'Tarun'}])
print("writing completed")
```

12. Write a program to set data at runtime and writing it in a CSV file.

Ans.

```
import csv
with open('c:\\pyprg\\ch13\\dynamicfile.csv', 'w') as f:
w = csv.writer(f)
    ans='y'
while (ans=='y'):
    name = input("Name?: ")
date = input("Date of birth: ")
    place = input("Place: ")
w.writerow([name, date, place])
    ans=input("Do you want to enter more y/n?: ")
F=open('c:\\pyprg\\ch13\\dynamicfile.csv','r')
reader = csv.reader(F)
for row in reader:
    print(row)
F.close()
```

☆☆☆

UNIT-V INTEGRATING PYTHON WITH MYSQL AND C++

CHAPTER 14

Importing C++ Programs in Python

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. **Which of the following is not a scripting language?**
(a) JavaScript (b) PHP
(c) Perl (d) HTML
[Ans. (d) HTML]

2. **Importing C++ program in a Python program is called** *[HY-2019]*
(a) wrapping (b) Downloading
(c) Interconnecting (d) Parsing
[Ans. (a) wrapping]

3. **The expansion of API is**
(a) Application Programming Interpreter
(b) Application Programming Interface
(c) Application Performing Interface
(d) Application Programming Interlink
[Ans. (b) Application Programming Interface]

4. **A framework for interfacing Python and C++ is**
(a) Ctypes (b) SWIG
(c) Cython (d) Boost
[Ans. (d) Boost]

5. **Which of the following is a software design technique to split your code into separate parts?** *[PTA-5]*
(a) Object oriented Programming
(b) Modular programming
(c) Low Level Programming
(d) Procedure oriented Programming
[Ans. (b) Modular 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
[Ans. (a) OS 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
[Ans. (c) args variable]

8. **Identify the function call statement in the following snippet.** *[Govt. MQP-2019]*

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

(a) main(sys.argv[1:]) (b) __name__
(c) __main__ (d) argv
[Ans. (b) __name__]

9. **Which of the following can be used for processing text, numbers, images, and scientific data?**
(a) HTML (b) C
(c) C++ (d) PYTHON
[Ans. (d) PYTHON]

10. **What does __name__ contains ?** *[PTA-6]*
(a) c++ filename (c) main() name
(c) python filename (d) os module name
[Ans. (C) python filename]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

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

Ans.
(i) The theoretical difference between the two is that scripting languages do not require the compilation step and are rather interpreted.
(ii) For example, normally, a C++ program needs to be compiled before running whereas, a scripting language like JavaScript or Python need not be compiled.
(iii) A scripting language requires an interpreter while a programming language requires a compiler.

2. **Differentiate compiler and interpreter.**

Ans. *[Govt. MQP-2019]*

S.No	Compiler	Interpreter
(i)	Compiler generates an Intermediate Code.	Interpreter generates Machine Code.
(ii)	Compiler reads entire program for compilation.	Interpreter reads single statement at a time for interpretation.
(iii)	Error deduction is difficult.	Error deduction is easy.
(iv)	Comparatively faster.	Slower.
(v)	**Example :** C++	**Example :** Python

3. Write the expansion of (i) SWIG (ii) MinGW *[PTA-1, 5]*

Ans. **(i)** SWIG – Simplified Wrapper Interface Generator – Both C and C++.

(ii) MINGW – Minimalist GNU for Windows

4. What is the use of modules?

Ans. **(i)** The use of modules to break down large programs into small manageable and organized files.

(ii) Modules provide reusability of code. Define our most used functions in a module and import it, instead of copying their definitions into different programs.

5. What is the use of cd command. Give an example.

Ans. 'cd' command refers to change directory and absolute path refers to the couple path.
(Eg) "cd c:\program files\open office 4\program"

PART - III
ANSWER THE FOLLOWING QUESTIONS
(3 MARKS)

1. Differentiate PYTHON and C++. *[HY-2019]*

Ans.

S. No	PYTHON	C++
(i)	Python is typically an "interpreted" language	C++ is typically a "compiled" language
(ii)	Python is a dynamic-typed language	C++ is compiled statically typed language
(iii)	Data type is not required while declaring variable	Data type is required while declaring variable
(iv)	It can act both as scripting and general purpose language	It is a general purpose language

2. What are the applications of scripting language? *[PTA-4]*

Ans. **(i)** To automate certain tasks in a program

(ii) Extracting information from a data set

(iii) Less code intensive as compared to traditional programming language

(iv) can bring new functions to applications and glue complex systems together

3. What is MinGW? What is its use?

Ans. **(i)** 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.

(ii) MinGw-W64 (version of MinGW) is the best compiler for C++ on Windows. To compile and execute the C++ program, you need 'g++' for Windows. MinGW allows to compile and execute C++ program dynamically through Python program using g++.

(iii) Python program that contains the C++ coding can be executed only through minGW-w64 project' run terminal. The run terminal open the command-line window through which Python program should be executed.

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

welcome.display() *[PTA-6]*

Ans.
Welcome → Module name
. → Dot operator
display() → Function call

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

Ans. 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.

main(sys.argv[1]) :

(i) Accepts the program file (Python program) and the input file (C++ file) as a list(array).

(ii) argv[0] contains the Python program which is need not to be passed because by default _main_contains source code reference.

(iii) argv[1] contains the name of the C++ file which is to be processed.

PART - IV

ANSWER THE FOLLOWING QUESTIONS

(5 MARKS)

1. Write any 5 features of Python. *[PTA-3]*

Ans.
(i) Python uses Automatic Garbage Collection.
(ii) Python is a dynamically typed language.
(iii) Python runs through an interpreter.
(iv) Python code tends to be 5 to 10 times shorter than that written in C++.
(v) In Python, there is no need to declare types explicitly.
(vi) In Python, a function may accept an argument of any type, and return multiple values without any kind of declaration beforehand.

2. Explain each word of the following command.

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

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

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

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

Ans.
(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 :
(i) 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) To use **sys.argv**, you will first have to **import sys**. The first argument, sys.argv[0], is always the name of the program as it was invoked, and sys.argv[1] is the first argument you pass to the program (here it is the C++ file).

(ii) **Python's OS Module :**
(i) The **OS** module in Python provides a way of using operating system dependent functionality.
(ii) The functions that the **OS** module allows you to interface with the Windows operating system where Python is running on.

os.system():
(i) Execute the C++ compiling command (a string contains Unix, C command which also supports C++ command) in the shell (Here it is Command Window).
(ii) For Example to compile C++ program **g++ compiler** should be invoked.
(iv) **Command :** os.system ('g++' + <varaiable_name1> '-<mode>' + <variable_name2>

(i)	os.system	function system() defined in os module
(ii)	g++	General compiler to compile C++ program under Windows Operating system.
(iii)	variable_name1	Name of the C++ file without extension.cpp in string format
(iv)	mode	To specify input or output mode. Here it is o prefixed with hyphen.

Python getopt module :
(i) The getopt module of Python helps you to parse (split) command-line options and arguments.
(ii) This module provides two functions to enable command-line argument parsing.

(iii) **Python getopt.getopt method :**
(i) This method parses command-line options and parameter list. Following is the syntax for this method –
(ii) <opts>,<args>=getopt.getopt(argv, options, [long_options])

- **argv** - This is the argument list of values to be parsed (splited). In our program the complete command will be passed as a list.
- **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.
- **long_options** - This parameter is passed with a list of strings. Argument of Long options should be followed by an equal sign ('=').
- In our program the C++ file name will be passed as string and 'i' also will be passed along with to indicate it as the input file.

(iv) **getopt()** method returns value consisting of two elements.

(v) Each of these values are stored separately in two different list (arrays) opts and args.

(vi) **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.

(vi) **args** will be an empty array if there is no error in splitting strings by getopt().

(vii) **Example :**

(viii) opts, args = getopt.getopt (argv, "i:",['ifile='])

- where opts contains - ('i', 'c:\\pyprg\\p4')]
- -i: - option nothing but mode should be followed by :
- 'c:\\pyprg\\p4' - value nothing but the absolute path of C++ file.

(ix) In our examples since the entire command line commands are parsed and no leftover argument, the second argument args will be empty [].

(x) If args is displayed using print() command it displays the output as [].

(xi) **Example :**

(i) >>>print(args)

(ii) []

4. Write the syntax for getopt() and explain its arguments and return values. *[PTA-2, 5]*

Ans. **Python getopt Module :**

(i) The getopt module of Python helps you to parse (split) command-line options and arguments.

(ii) This module provides two functions to enable command-line argument parsing.

getopt.getopt method : This method parses command-line options and parameter list. Following is the syntax for this method –

<opts>,<args>=getopt.getopt(argv, options, [long_options])

Here is the detail of the parameters –

(i) **argv :** This is the argument list of values to be parsed (splited). In our program the complete command will be passed as a list.

(ii) **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.

(iii) **long_options :** This parameter is passed with a list of strings. Argument of Long options should be followed by an equal sign ('='). In our program the C++ file name will be passed as string and 'i' also will be passed along with to indicate it as the input file.

getopt() method returns value consisting of two elements. Each of these values are stored separately in two different list (arrays) **opts** and **args**. 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. args will be an empty array if there is no error in splitting strings by getopt().

For example, The Python code which is going to execute the C++ file p4 in command line will have the getopt() method like the following one.

opts, args = getopt.getopt (argv, "i:",['ifile='])

where **opts** contains	[('-i', 'c:\\pyprg\\p4')]
-i :-	**option** nothing but **mode should be followed by :**
'c:\\pyprg\\p4'	**value** nothing but the **absolute path of C++ file.**

In our examples since the entire command line commands are parsed and no leftover argument, the **second argument args** will be empty []. If args is displayed using print() command it displays the output as [].

5. Write a Python program to execute the following c++ coding

```
#include <iostream>
using namespace std;
int main()
{ cout<<"WELCOME";
return(0);
}
```

The above C++ program is saved in a file welcome.cpp

Ans. #Now select File→New in Notepad and type the Python program as main.py

```
# Program that compiles and executes a .cpp file
# Python main.py -i welcome
import sys, os, getopt
def main(argv):
    cpp_file = ''
    exe_file = ''
    opts, args = getopt.getopt(argv, "i:",['ifile='])
    for o, a in opts:
        if o in ("-i", "--ifile"):
        cpp_file = a + '.cpp'
        exe_file = a + '.exe'
        run(cpp_file, exe_file)
def run(cpp_file, exe_file):
    print("Compiling " + cpp_file)
    os.system('g++ ' + cpp_file + ' -o ' + exe_ file)
    print("Running " + exe_file)
    print("------------------------")
    print
    os.system(exe_file)
    print
if __name__ =='__main__':
    main(sys.argv[1:])
```

Output :

```
WELCOME
```

Hands on Experience

1. Write a C++ program to create a class called Student with the following details

Protected member

Rno integer

Public members

void Readno(int); to accept roll number and assign to Rno

void Writeno(); To display Rno.

The class Test is derived Publically from the Student class contains the following details

Protected member

Mark1 float

Mark2 float

Public members

void Readmark(float, float); To accept mark1 and mark2

void Writemark(); To display the marks

Create a class called Sports with the following detail

Protected members

score integer

Public members

void Readscore(int); To accept the score

void Writescore(); To display the score

The class Result is derived Publically from Test and Sports class contains the following details

Private member

Total float

Public member

void display() assign the sum of mark1, mark2, score in total.

invokeWriteno(), Writemark() and Writescore(). Display the total also.

Save the C++ program in a file called hybrid. Write a python program to execute the hybrid.cpp

Ans. In Notepad, type the C++ program.

```
#include<iostream>
using namespace std;
class student
{
protected:
    int no;
public:
void readno(int rollno)
{
    mo = rollno;
}
```

```
void writeno()
{
        cout<<"\n Roll no."<<rno;
}};
class test: public student
{
        protected:
        float mark1,mar2;
        public:
void readmark(float m1, float m2)
{
        mark1 = m1;
        mark2 = m2;
}
void writemark()
{
        cout<<"\n mark1"<<mark1;
        cout<<"\n mark2"<<mark2;
}};
class sports
{
        protected:
              int score;
        public:
void readscore(int s)
{
        score = s;
}
void writescore()
{
        cout<<"SCORE:"<<score;
}};
class result : public test, public sports
{
        private:
        float total;
        public;
        void display()
        {
              total = mark1 + mark2;
              cout<<"TOTAL MARKS: "<<total;
}};
int main()
{
        result r;
        r.readno(5);
        r.readmark(100,100);
        r.readscore(200);
        r.writeno();
        r.writemark();
        r.display();
        r.writescore();
        return ();
}
```

save this file as hybrid.cpp
Now type the python program in New Notepad file.

```
#python hybrid.py -i hybrid.cpp
import sys,os,getopt
def main(argv);
        cpp_file="
        exe_file="
        opts, args = getopt.getopt(argv, "i:",
                                        [ifile='])
        for o, a in opts:
        if o, a in opts:
        cpp_file=a+'.cpp'
        exe_file=a+'.exe'
        run(cpp_file, exe_file)
def run(cpp_file, exe_file)
        print("Compiling"+cpp_file)
        os.system('g++'+ cpp_file + '-o'+ exe_file)
        print("Running" + exe_file)
        print("-------------------")
        print
        os.system(exe_file)
        print
if__name__=='__main__':
main(sys.argv[1:])
```

Output :

```
Rollno   : 5
Mark1   : 100
Mark2   : 100
TOTAL MARKS : 200
SCORE : 200
```

2. Write a C++ program to print boundary elements of a matrix and name the file as Border.cpp. Write a python program to execute the Border.cpp

Ans. Select File → New in Notepad and type the C++ program.

```
#include<iostream>
#include<bits/stdc++.h>
using namespace std;
        const int MAX = 100;
void printBoundary(int a[][max], int m, int n)
{
        for(int i=0; i < m; i++)
        {
              for(int j=0; j < n; j++)
              {
                    if(i= =0 || j= =0 || i= =n–1 ||
                                              j= =n–1)
                          cout<<a[i][j]<<" ";
```

```
                else
                    cout <<" "
                    cout << " ";
            }
                    cout <<"\n;
            }}
int main()
{
    int a[4][MAX] = { {1,2,3,4}, {5,6,7,8},
                      {1,2,3,4}, {5,6,7,8}};
    print Boundary(a,4,4);
    return 0;
}
```

save it as Border.cpp

open a New notepad file and type the python program to execute border.cpp

```
#python border.py -i border.cpp
import sys,os,getopt
def main(argv):
    cpp_file ="
    exe_file ="
    opts, args= getopt.getopt(argv, "i:",
                                ['ifile="])
    for o, a in opts:
    if o in("-i", "--ifile"):
    cpp_file = a+'.cpp'
    exe_file = a+'.exe'
    run(cpp_file, exe_file)
def run(cpp_file, exe_file):
    print("Compiling" + cpp_file)
    os.system('g++'+ cpp_file + '-o'+ exe_file)
    print("Running" + exe_file)
    print("----------")
    print
    os.system(exe_file)
    print
    if__name__=='__main__':
    main(sys.argv[1:])
```

Output :

```
1   2   3   4
5           8
1           4
5   6   7   8
```

PTA Questions and Answers

1 MARK

1. **Which of the following is the special variable which by default stores the name of the file?** *[PTA-1]*

(a) __name__ (b) __init__
(c) __del__ (d) __def__

[Ans. (a) __name__]

2. **_____ is a built-in variable which evaluates to the name of the current module.** *[PTA-4]*

(a) __name__ (b) __main__
(c) __mode__ (d) __init__

[Ans. (a) __name__]

Additional Questions and Answers

Choose the Correct Answer 1 MARK

1. **Which of the following are general purpose programming language?**

(a) Python (b) C++
(c) Java (d) All of these

[Ans. (d) All of these]

2. **Which of the following is not general purpose language?**

(a) Python (b) Perl
(c) Java (d) C++

[Ans. (b) Perl]

3. **Which of the following is not a compiled statically typed language?**

(a) C++ (b) Java
(c) Python (d) All of these

[Ans. (c) Python]

4. **In which language datatype or not required while declare variable?**

(a) C++ (b) C
(c) Java (d) Python

[Ans. (d) Python]

5. **Which of the following can act both as scripting and general purpose language?**

(a) Python (b) C
(c) C++ (d) Html

[Ans. (a) Python]

6. Which programming language is useful when the logic can be written in C++ and manipulated through python program?
(a) C++ (b) Python
(c) Perl (d) Html
[Ans. (b) Python]

7. Which is a programming language designed for integrating and communicating with other programming languages?
(a) Modular language
(b) Procedural language
(c) Scripting language
(d) Procedural language
[Ans. (a) Modular language]

8. Which of the following is a scripting language?
(a) Ruby (b) ASP
(c) TCl (d) All of these
[Ans. (d) All of these]

9. Which of the following language used automatic garbage collection?
(a) C++ (b) Java
(c) C (d) Python
[Ans. (d) Python]

10. A scripting language requires
(a) Compiler (b) Interpreter
(c) Python (d) Modules
[Ans. (b) Interpreter]

11. A programming language requires
(a) Complier
(b) Interpreter
(c) Modules
(d) Scripts
[Ans. (b) Interpreter]

12. C++ code is 5 to 10 times more than
(a) Java (b) Python
(c) C (d) Java script
[Ans. (b) Python]

13. How many ways are there to create python interface?
(a) 4 (b) 3
(c) 5 (d) Many
[Ans. (d) Many]

14. Which of the following interface used for interfacing with C programs?
(a) MicGW (b) Boost
(c) Ctypes (d) Cython
[Ans. (c) Ctypes]

15. SWIG expansion is
(a) Simplified Wrapper Interface Generator
(b) Software Wrapper Information Generator
(c) Simplified Wrapper Interface Generator
(d) System Wrapper Interface Generator
[Ans. (a) Simplified Wrapper Interface Generator]

16. Which of the following python interface used for both C and C++?
(a) MinGW (b) Ctypes
(c) Cython (d) SWIG
[Ans. (d) SWIG]

17. MinGW expansion is
(a) Minimalist Graphics for windows
(b) Minimum GNU for windows
(c) Minimalist GNU for windows
(d) Motion Graphics for windows
[Ans. (c) Minimalist GNU for windows]

18. Which of the following is needed to run a C++ program on windows?
(a) m++ (b) g++
(c) ghre++ (d) f++
[Ans. (b) g++]

19. The command to change to the folder where Python is located is
(a) Change (b) CD
(c) Dir (d) CDir
[Ans. (b) CD]

20. The syntax to execute the python program is
(a) Python –i <filename.Py> <C++ filename>
(b) Python <filename – py> <C++ filename> -i
(c) Python <C++ filename> -i <filename.py>
(d) Python <filename.py> -i <C++ filename>
[Ans. (d) Python <filename.py> -i <C++ filename>]

21. In the command python <filename.py> - i <C++ filename> where i denotes.
(a) Information (b) Input mode
(c) ios (d) Interpreter
[Ans. (b) Input mode]

22. Which of the following is not a python module?
(a) OS (b) Sys
(c) Tel (d) Getopt
[Ans. (c) Tel]

23. The operator used to access the python functions using modules is
(a) . (b) : (c) , (d) : :
[Ans. (a) .]

24. Which of the following is not a python module?
(a) Sys (b) OS
(c) Getopt (d) g++
[Ans. (d) g++]

25. Which of the following is a python module?
(a) Sys (b) OS
(c) Getopt (d) All of these
[Ans. (d) All of these]

26. Which of the following is an array holding the command line arguments of the program?
(a) g++ (b) argv
(c) Opts (d) Getopt
[Ans. (b) argv]

27. How many options getopt provides to enable command line argument parsing?
(a) 3 (b) 7 (c) 2 (d) 4
[Ans. (c) 2]

28. Getopt () method returns values are started in
(a) Opts (b) Args
(c) Sys (d) a and b
[Ans. (d) a and b]

29. The mode 'i'/'o' parses each values of the command line and pass as argument to the list called
(a) Args (b) Opts
(c) Sys (d) Argv
[Ans. (b) Opts]

30. Which of the following definition invoke the 'g++' compiler and creates the exe file?
(a) Main (b) Name
(c) Run (d) System
[Ans. (c) Run]

MATCH THE FOLLOWING

1.

1	PHP	Interface with C
2	HTML	Interface generator both C & C++
3	SWIG	Programming language
4	API	Scripting language

(a) 1-2-3-4 (b) 4-3-2-1
(c) 4-2-3-1 (d) 4-1-2-3
[Ans. (b) 4-3-2-1]

CHOOSE THE ODD MAN OUT

1. (a) Java (b) Python
(c) HTML (d) C++**[Ans. (b) Python]**

CHOOSE AND FILL IN THE BLANKS

1. _____ is typically interpreted language.
(a) Python (b) Java
(c) C++ (d) None of these
[Ans. (a) Python]

2. _____ is mostly used as a 'glue' language.
(a) C++ (b) Java
(c) Python (d) CSV
[Ans. (c) Python]

3. _____ is both a python like language for writing C extensions.
(a) Boost
(b) Cython
(c) SWIG
(d) Ctypes **[Ans. (b) Cython]**

4. _____ refers to a set of runtime header files used in compiling and linking the C++ code to be run or window OS?
(a) SWIG (b) MinGW
(c) Cython (d) Boost
[Ans. (b) MinGW]

5. _____ version of MinGW is the best compiler for C++ on windows.
(a) W32 (b) W128
(c) W256 (d) W64
[Ans. (d) W64]

6. _____ allows to compile and execute C++ program dynamically through python program using g++.
(a) MinGW (b) Ctypes
(c) Boost (d) SWIG
[Ans. (a) MinGW]

7. _____ is a program that calls GCC for linking the C++ library files to the object code.
(a) C++ (b) C
(c) Python (d) g++
[Ans. (d) g++]

8. _____ refers to the complete path where python is installed.
(a) Relative path
(b) Python path
(c) Absolute path
(d) Directory path [Ans. (c) Absolute path]

9. _____ is a software design technique to split the code into separate parts.
(a) Procedural programming
(b) Structural programming
(c) Object Oriented Programming
(d) Modular Programming
[Ans. (d) Modular Programming]

10. _____ refers to a file containing python statements and definitions?
(a) Procedures
(b) Modules
(c) Structures
(d) Objects [Ans. (b) Modules]

11. _____ is the list of command-line argument passed to the python program?
(a) OS.system ()
(b) Getopt.getopt ()
(c) Sys.argv
(d) Next () [Ans. (c) Sys.argv]

12. To use sys.argv, you have to _____
(a) Import CSV (b) Import.+ py
(c) Import sys (d) Include sys
[Ans. (c) Import sys]

13. ___ symbol is os.system () indicates that all strings are concatenated and send that as a list.
(a) + (b) . (c) () (d) _
[Ans. (a) +]

14. _____ module of python helps you to split command line options and arguments.
(a) OS (b) Getopt
(c) Sys (d) All of these
[Ans. (b) Getopt]

15. _____ method returns value consisting of two elements.
(a) sys.argv
(b) oS.system ()
(c) getopt ()
(d) none of these [Ans. (c) getopt ()]

16. ____ command of 'os' module executes the exe file to get the desired output.
(a) Main () (b) Name ()
(c) Run () (d) System ()
[Ans. (d) System ()]

17. The command to clear the window screen is___
(a) Cls (b) Clear
(c) Clr (d) Clrscr
[Ans. (a) Cls]

18. The keyword used to import the module is_____
(a) Include (b) Input
(c) Import (d) None of these
[Ans. (c) Import]

CHOOSE THE INCORRECT STATEMENT

1. (i) C++ program needs to be compiled before running.

(ii) Python need to be compile(d)

(iii) Perl, Ruby, ASP are the scripting languages.

(iv) Python is not high-level general purpose programming language.

(a) i and ii

(b) ii and iii

(c) ii and iv

(d) i, ii and iv **[Ans. (c) ii and iv]**

VERY SHORT ANSWERS **2 MARKS**

1. Differentiate static typed language and dynamic typed language.

Ans. **(i)** A static typed language like C++ requires the programmer to explicitly tell the computer what "data type" each data value is going to use.

(ii) A dynamic typed language like Python, doesn't require the data type to be given explicitly for the data. Python manipulate the variable based on the type of value.

2. List some scripting language.

Ans. The most widely used scripting languages are JavaScript, VBScript, PHP, Perl, Python, Ruby, ASP and Tcl.

3. What is garbage collection in python?

Ans. **(i)** Python deletes unwanted objects (built-in types or class instances) automatically to free the memory space.

(ii) The process by which Python periodically frees and reclaims blocks of memory that no longer are in use is called Garbage Collection.

4. What is the use of GNU C complier?

Ans. g++ is a program that calls GCC (GNU C Compiler) and automatically links the required C++ library files to the object code.

5. How will you execute C++ program through python using MinGW interface? Give example.

Ans. Executing C++ Program through Python

(i) Double click the run terminal of MinGW

(ii) Go to the folder where the Python software is located (Python.exe) is located.

For example here "Python" is located in

6. What does cd command refers?

Ans. The "cd" command refers to changes directory and absolute path refers to the complete path where Python is installed.

7. Write a note on

(i) CD command

(ii) Cls command

Ans. **(i)** **CD command :** The "cd" command refers to changes directory and absolute path refers to the complete path where Python is installed.

(ii) **Cls command :** To clear the screen in command window use **cls** command

8. What is meant by module?

Ans. **(i)** Modular programming is a software design technique to split your code into separate parts.

(ii) These parts are called modules. The focus for this separation should have modules with no or just few dependencies upon other modules.

9. Write a note on main (sys.argv [1]).

Ans. **main(sys.argv[1]) :** Accepts the program file (Python program) and the input file (C++ file) as a list(array). argv[0] contains the Python program which is need not to be passed because by default __main__ contains source code reference and **argv[1]** contains the name of the **C++ file** which is to be processed.

10. Write the syntax and example of (i) os.system () (ii) getopt ()

Ans. **(i)** os.system ('g++' + <varaiable_name1> '-<mode>' + <variable_name2>

(ii) <opts>,<args>=getopt.getopt(argv, options, [long_options])

11. Write a command for wrapping C++ code.

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

Short Answers 3 MARKS

1. Write a note on (i) sys module (ii) OS module (iii) getopt module

Ans.
(i) sys module provides access to some variables used by the interpreter and to functions that interact with the interpreter

(ii) OS module in Python provides a way of using operating system dependent functionality

(iii) The getopt module of Python helps you to parse (split) command-line options and arguments.

2. List the commonly used python interfaces.

Ans. The commonly used interfaces are

(i) Python-C-API (API-**Application Programming Interface** for interfacing with C programs)

(ii) Ctypes (for interfacing with c programs)

(iii) SWIG (Simplified Wrapper Interface Generator- Both C and C++)

(iv) Cython (Cython is both a Python-like language for writing C-extensions)

(v) Boost. Python (a framework for interfacing Python and C++)

(vi) MinGW (Minimalist GNU for Windows)

3. How to import modules in python?

Ans.
(i) We can import the definitions inside a module to another module. We use the import keyword to do this.

(ii) Using the module name we can access the functions defined inside the module. The dot (.) operator is used to access the functions. The syntax for accessing the functions from the module is

<module name> . <function name>

(iii) **Example :** >>> factorial.fact(5)

4. Write an algorithm for executing C++ program pali_cpp.cpp using python program.pali.py.

Ans.
Step 1 : Type the C++ program to check whether the input number is palindrome or not in notepad and save it as "pali_cpp.cpp".

Step 2 : Type the Python program and save it as pali.py

Step 3 : Click the Run Terminal and open the command window

Step 4 : Go to the folder of Python using cd command

Step 5 : Type the command Python pali.py -i pali_cpp

Long Answers 5 MARKS

1. Explain the commands for wrapping C++ code.

Ans. **commands for wrapping C++ code :**

if__name__=='__main__':
main(sys.argv[1:])

__name__ (A Special variable) in Python :

(i) Since there is no main() function in Python, when the command to run a Python program is given to the interpreter, the code that is at level 0 indentation is to be executed.

(ii) However, before doing that, interpreter will define a few special variables. __name__ is one such special variable which by default stores the name of the file. If the source file is executed as the main program, the interpreter sets the __name__ variable to have a value as "__main__".

(iii) __name__ is a built-in variable which evaluates to the name of the current module. Thus it can be used to check whether the current script is being run on its own.

(iv) For example consider the following :

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

(v) if the command line Python program itself is going to execute first, then __main__ contains the name of that Python program and the Python special variable __name__ also contain the Python program name.

(vi) If the condition is true it calls the **main** which is passed with C++ file as argument.

2. Write a python program to execute the following C++ program.

/*. To check whether the number is palindrome or not using while loop.*/

Ans. //Now select File->New in Notepad and type the C++ program

```
#include <iostream>
using namespace std;
int main()
{
int n, num, digit, rev = 0;
cout<< "Enter a positive number: ";
cin>>num;
n = num;
    while(num)
    { digit = num % 10;
        rev = (rev * 10) + digit;
        num = num / 10; }
cout<< " The reverse of the number is: " << rev <<endl;
    if (n == rev)
        cout<< "The number is a palindrome";
    else
        cout<< " The number is not a palindrome";
    return 0;
}
```

```
// Save this file as pali_cpp.cpp
#Now select File→New in Notepad and type the Python program
# Save the File as pali.py . Program that compiles and executes a .cpp file
# Python c:\pyprg\pali.py -i c:\pyprg\pali_cpp
import sys, os, getopt
def main(argv):
    cpp_file = ''
    exe_file = ''
    opts, args = getopt.getopt(argv, "i:",['ifile='])
    for o, a in opts:
        if o in ("-i", "--ifile"):
        cpp_file = a + '.cpp'
        exe_file = a + '.exe'
        run(cpp_file, exe_file)
def run(cpp_file, exe_file):
    print("Compiling " + cpp_file)
    os.system('g++'+cpp_file + ' -o ' + exe_ file)
    print("Running " + exe_file)
    print("----------")
    print
    os.system(exe_file)
    print
if __name__ =='__main__':          #program starts executing from here
    main(sys.argv[1:])
```

☆☆☆

CHAPTER 15

DATA MANIPULATION THROUGH SQL

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

1. Which of the following is an organized collection of data?

(a) Database (b) DBMS
(c) Information (d) Records

[Ans. (a) Database]

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

[Ans. (b) Relational Database system]

3. Which of the following is a control structure used to traverse and fetch the records of the database? *[PTA-4]*

(a) Pointer (b) Key
(c) Cursor (d) Insertion point

[Ans. (c) Cursor]

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

[Ans. (c) Commit]

5. Which of the following executes the SQL command to perform some action?

(a) execute() (b) key()
(c) cursor() (d) run()

[Ans. (a) execute()]

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()

[Ans. (c) AVG()]

7. The function that returns the largest value of the selected column is

(a) MAX() (b) LARGE()
(c) HIGH() (d) MAXIMUM()

[Ans. (a) MAX()]

8. Which of the following is called the master table? *[PTA-6]*

(a) sqlite_master
\(b) sql_master
(c) main_master
(d) master_main **[Ans. (a) sqlite_master]**

9. The most commonly used statement in SQL is

(a) cursor (b) select *[HY-2019]*
(c) execute (d) commit

[Ans. (b) select]

10. Which of the following clause avoid the duplicate? *[PTA-5]*

(a) Distinct (b) Remove
(c) Where (d) GroupBy

[Ans. (a) Distinct]

PART - II

ANSWER THE FOLLOWING QUESTIONS (2 MARKS)

1. Mention the users who use the Database.

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

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

Ans. Create a connection using connect () method and pass the name of the database File.

Example :

```
import sqlite3
# connecting to the database
connection = sqlite3.connect("Academy.db")
# cursor
cursor = connection.cursor()
```

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

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

If the table is empty, the value 1 will be used.

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

Ans. To populate (add record) the table "INSERT" command is passed to SQLite. "execute" method executes the SQL command to perform some action.

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)
```

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

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

Example : result = cursor.fetchall()

PART - III

ANSWER THE FOLLOWING QUESTIONS (3 MARKS)

1. What is SQLite? What is it advantage? *[PTA-1; HY-2019]*

Ans.

(i) SQLite is a simple relational database system, which saves its data in regular data files or even in the internal memory of the computer.

(ii) It is designed to be embedded in applications, instead of using a separate database server program such as MySQLor Oracle.

(iii) SQLite is fast, rigorously tested, and flexible, making it easier to work. Python has a native library for SQLite.

2. Mention the difference between fetchone() and fetchmany(). *[PTA-4]*

Ans.

	fetchone()	fetchmany()
(i)	The fetchone() method returns the next row of a query result set or None in case there is no row left	The fetchmany() method returns the next number of rows (n) of the result set.
(ii)	Using while loop and fetchone() method we can display all the records from a table.	Displaying specified number of records is done by using fetchmany().

3. What is the use of Where Clause?. Give a python statement using the where clause. *[Govt. MQP-2019]*

Ans. The WHERE clause is used to extract only those records that fulfill a specified condition.

Example : To display the different grades scored by male students from "student table"

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

OUTPUT:

```
('B',)
('A',)
('C',)
('D',)
```

4. Read the following details.Based on that write a python script to display departmentwise records *[PTA-5, 6]*

database name : organization.db
Table name : Employee
Columns in the table : Eno, EmpName, Esal, Dept

Ans.

```
import sqlite3
connection = sqlite3. connect ("organization.db")
cursor = connection . cursor ()
cursor. execute ("SELECT * FROM Employee GROUPBY Dept")
for row in c:
    print(row)
conn.close()
```

5. Read the following details. Based on that write a python script to display records in desending order of Eno

database name : organization.db
Table name : Employee
Columns in the table : Eno, EmpName, Esal, Dept

Ans.

```
import sqlite3
connection = sqlite3 . connect ("organization. db")
cursor = connection . cursor ()
cursor. execute ("SELECT * FROM Employee ORDER BY Eno DESC")
result = cursor . fetchall ()
print (result)
```

PART - IV

ANSWER THE FOLLOWING QUESTIONS (5 MARKS)

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

Ans. **(i)** SQLite is a simple relational database system, which saves its data in regular data files or even in the internal memory of the computer.

(ii) It is designed to be embedded in applications, instead of using a separate database server program such as MySQLor Oracle.

Advantages :

(i) SQLite is fast, rigorously tested, and flexible, making it easier to work. Python has a native library for SQLite.

To use SQLite,

Step 1 : import sqlite3

Step 2 : create a connection using connect () method and pass the name of the database file

Step 3 : Set the cursor object cursor = connection. cursor ()

(ii) Connecting to a database in step2 means 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.

(iii) Cursor in step 3 is a control structure used to traverse and fetch the records of the database.

(iv) Cursor has a major role in working with Python. All the commands will be executed using cursor object only.

(v) To create a table in the database, create an object and write the SQL command in it.

Example : sql_comm = "SQL statement"

(vi) For executing the command use the cursor method and pass the required sql command as a parameter. Many number of commands can be stored in the sql_comm and can be executed one after other.

(vii) Any changes made in the values of the record should be saved by the commend "Commit" before closing the "Table connection".

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

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

Ans. Assume database name, is shop.db and table name is electronics for the given table.

Python Script :

```
import sqlite3
connection = sqlite3.connect ("shop.db")
cursor = connection . cursor ()
cusrsor . execute ("SELECT * FROM
                                    electronics")
result = cursor . fetchall ()
print (* result, sep = "\n")
```

Output :

```
Displaying All the Records
(1003,    'Scanner',    10500)
(1004,    'Speaker',    3000)
(1005,    'Printer',    8000)
(1008,    'Monitor',    15000)
(1010,    'Mouse',      700)
```

3. What is the use of HAVING clause? Give an example python script. *[PTA-5]*

Ans. 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)
```

Output :

```
['gender', 'COUNT(GENDER)']
[('M', 5)]
```

4. **Write a Python script to create a table called ITEM with following specification.**
Add one record to the table.
Name of the database : ABC
Name of the table : Item
Column name and specification :

Icode	:	integer and act as primary key
Item Name	:	Character with length 25
Rate	:	Integer
Record to be added	:	1008, Monitor,15000

Ans.
```
import sqlite3
connection = sqlite3 . connect ("ABc.db")
cursor = connection . cursor ()
sql_command = " " " CREATE TABLE Item
(Icode INTEGER, Item_
Name VARCHAR (25), Rate
Integer); " " " cursor.execute
(sql_command)
sql_command = " " "INSERT INTO Item (Icode,
Item_name, Rate)
VALUES (1008, "Monitor", 15000); " " "
cursor.execute (sql_command)
connection.commit ()
connection.close ()
print ("TABLE CREATED")
```
Output :
TABLE CREATED

5. **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 Itemname of suppliers who do not reside in Delhi.
(ii) Increment the SuppQty of Akila by 40.

Ans. **(i)**
```
import sqlite3
connection = sqlite3.connect("ABC.db")
cursor.execute("SELECT Supplier.Name,
Supplier.City,Item.ItemName FROM
Supplier,Item WHERE Supplier.Icode=
Item.Icode AND Supplir.City NOT In
Delhi")
s = [i[0] for I in cursor.
description]
print(s)
result = cursor.fetchall()
for r in result:
print r
```
Output :
```
['Name',    'City',      'ItemName']
['Anu',     'Bangalore', 'Scanner']
['Shahid',  'Bangalore', 'Speaker']
['Akila',   'Hydrabad',  'Printer']
['Girish',  'Hydrabad',  'Monitor']
['Shylaja', 'Chennai',   'Mouse']
['Lavanya', 'Mumbai',    'CPU']
```
(ii)
```
import sqlite3
connection = sqlite3.connect("ABC.db")
cursor.execute("UPDATE Supplier ST
SuppQty = SuppQty + 40 WHERE Name =
'Akila' ")
cursor.commit()
result = cursor.fetchall()
print (result)
connection.close()
```
OUTPUT :
(S004, 'Akila', 'Hydrabad', 1005, 235)

Hands on Experience

1. **Create an interactive program to accept the details from user and store in a csv file using Python for the following table.**
Database name; - DBI
Table name : Customer

Cust _Id	Cust _Name	Address	Phone _no	City
C008	Sandeep	14/1 Pritam Pura	41206819	Delhi
C010	Anurag Basu	15A, Park Road	61281921	Kolkata
C012	Hrithik	7/2 Vasant Nagar	26121949	Delhi

Ans.
```
import sqlite3
import io
import csv
d = open('c:/pyprg/sql.csv', 'w')
c = csv.writer(d)
connection = sqlite3.connect("dbl.db")
cursor = connection. cursor()
cursor.execute("create  table  customer(cust_Id,
        cust_name, Address, Phone_no, City)")
print("Enter 3 customer details: ")
print("Enter 3 customer Id: ")
cid = [int(input() for i in range (3)]
print("Enter customer names: ")
cname = [input() for i in range (3)]
print("Enter their Address: ")
add = [input() for i in range (3)]
int("Enter their phone numbers: ")
ph = [int(input()) for i in range (3)]
print("Enter their cities: ")
city = [input() for i in range (3)]
n = len(cname)
for i in range (n):
cursor.execute("insert into customer values
(?,?,?,?,?)", (cid[i], cname[i], add[i], ph[i],
                                        city[i]))
cursor.execute("Select * from customer")
co = [i[0] for i in cursor.description]
c.writerow(co)
data = cursor.fetchall()
for item in data:
    c.writerow(item)
d.close()
with open('c:/pyprg/sql.csv', "r", newline =
                                        None) as fd:
    for line in fd:
    line = line.replace("\n", " ")
print(line)
cursor.ckise()
connection.close()
```

Output :
```
Enter 3 customer details :
Enter 3 customer Id:
    C008
    C010
    C012
Enter customer names:
    Sandeep
    Anurag Basu
    Hrithik
Enter their Address:
    14/1 Pritam Pura
    15A, Park Road
    7/2 Vasant Nagar
Enter their Phone Numbers:
    41206819
    61281921
    26121949
Enter their cities:
    Delhi
    Kolkata
    Delhi
Displaying Data :
('cust_Id;, 'cust_Name', 'Address', 'Phone_no',
                                        'city')
(C008, 'Sandeep', '14/1 Pritampura', '41206819',
                                        'Delhi')
(C010, 'Anurag Basu', '15A, Park Road',
                                        '61281921', 'Kolkata')
(C012, 'Hrithik', '7/2 Vasant Nagar', '26121949',
                                        'Delhi')
```

2. Consider the following table GAMES. Write a python program to display the records for question (i) to (iv) and give outputs for SQL queries (v) to (viii) Table: GAMES

Code	Name	Game Name	Number	Prize Money	Schedule Date
101	Padmaja	Carom Board	2	5000	01-23-2014
102	Vidhya	Badminton	2	12000	12-12-2013
103	Guru	Table Tennis	4	8000	02-14-2014
105	Keerthana	Carom Board	2	9000	01-01-2014
108	Krishna	Table Tennis	4	25000	03-19-2014

(i) To display the name of all Games with their Gcodes in descending order of their schedule date.

(ii) To display details of those games which are having Prize Money more than 7000.

(iii) To display the name and gamename of the Players in the ascending order of Gamename.

(iv) To display sum of PrizeMoney for each of the Numberof participation groupings (as shown in column Number 4)

(v) Display all the records based on GameName

Ans. **(i)** To display the name of all Games with their Gcodes in descending order of their schedule data.

```
import sqlite3
conn = sqlite3.connect("Games.db")
cursor = conn.cursor()
cursor.execute("Select GameName, Gcode from
        Games order by ScheduleData Desc")
result = cursor,fetchal()
print(*result, sep = "\n")
con.close()
```

Output :

```
('Table Tennis', 108)
('Table Tennis', 103)
('Carom Board', 101)
('Carom Board', 105)
('Badminton', 102)
```

(ii) To display details of those gamnes which are having Prize Money more than 7000.

```
import sqlite3
conn = sqlit3.connect("Games.db")
cursor = conn.cursor()
cursor.execute("Select * from Games where
        prize money > 7000")
resul = cursor.fetchall()
print(*result, sep = "\n")
conn.close()
```

Output :

```
(102, 'Vidhya', 'Badminton', 2, 12000, '12-12-2013')
(103, 'Guru', 'Table Tennis', 4, 8000, '02-14-2014')
(105, 'Keerthana', 'Carom Board', 2, 9000, '01-01-2014')
(108, 'Krishna', 'Table Tennis', 4, 25000, '03-19-2004')
```

(iii) To dispaly the name and gamename of the Players in the ascending order of Gamename,

```
import sqlite3
conn = sqlite3.connect("Games.db")
cursor = conn. cursor()
cursor. execute("Select Name, GameName from
    games order by GameName")
result = cursor. fetchall()
print(*result, sep = "\n")
conn.close()
```

Output :

```
('Vidhya', Badminton')
('Padmaja', 'Carom Board')
("Keerthana', 'Carom Board')
('Guru', 'Table Tennis')
('Krishna', 'Table Tennis')
```

(iv) To display sum of PrizeMoney for each of the Number of participation groupings (as shown in column Number 4)

```
import sqlite3
conn = squlite3.connect("Games.db")
cursor = conn.cursor()
cursor.execute("Select
      Sum(Number*Prizemoney)from games")
                    result = cursor.fetchall()
print(result)
conn.close()
```

Output :

```
[(184000)]
```

(v) Display all the records based on GameName

```
import squlite3
conn = squlite3.connect("Games.db")
cursor = conn.cursor()
cursor.execute("Select*from games group by
    gamename")
result = cursor.fetchall()
print(*result, sep = "\n")
conn.close()
```

Output :

```
('Carom Board', 101, 'Padmaja', 2, 5000, '01-23-2014')
('Carom Board', 105, 'Keerthana', 2, 9000, '01-01-2014')
('Badminton', 102, 'Vidhya', 2, 12000, '12-12-2013')
('Table Tennis', 103, 'Guru', 4, 8000, '02-14-2014')
('Table Tennis', 108, 'Krishna', 4, 25000, '03-19-2014')
```

PTA Questions and Answers

1 MARK

1. Which method uses the SQL command to get all the data from the table? *[PTA-2]*

(a) get (b) select
(c) execute (d) Query

[Ans. (c) execute]

5 MARKS

1. Write a Python code to display all the records of the following table using fetchmany(). *[PTA-1]*

Reg.No	Name	Marks
3001	Chithirai	353
3002	Vaigasi	411
3003	Aani	374
3004	Aadi	289
3005	Aavani	507
3006	Purattasi	521

Ans. Assume database name, is month.db and table name for the given table.

Python Script :

```
import sqlite3
correction=sqlite3.connect("month.db")
cursor=connection.cursor()
cursor.execute("SELECT*FROM Tamil
                                Months")
result=cursor.fetchal()
print(*result, sep="/n")
```

2. Write a note on aggregate functions of SQL. *[PTA-6]*

Ans. These functions are used to do operations from the values of the column and a single value is returned.

(i) COUNT() **(ii)** AVG()
(iii) SUM() **(iv)** MAX()
(v) MIN()

(i) COUNT() function :

The SQL COUNT() function returns the number of rows in a table satisfying the criteria specified in the WHERE clause. COUNT() returns 0 if there were no matching rows.

Example : In this example we are going to count the number of records(rows)

```
import sqlite3
connection = sqlite3.connect("Academy.db")
cursor = connection.cursor()
cursor.execute("SELECT COUNT(*) FROM
                                student ")
result = cursor.fetchall()
print(result)
```

Output:

[(7,)]

(ii) AVG() :

The following SQL statement in the python program finds the average mark of all students.

Example :

```
import sqlite3
connection = sqlite3.connect("Academy.db")
cursor = connection.cursor()
cursor.execute("SELECT AVG(AVERAGE)
                                FROM student ")
result = cursor.fetchall()
print(result)
```

Output :

[(84.65714285714286,)]

(iii) SUM():

The following SQL statement in the python program finds the sum of all average in the Average field of "Student table".

Example :

```
import sqlite3
connection = sqlite3.connect("Academy.db")
cursor = connection.cursor()
cursor.execute("SELECT SUM(AVERAGE)
                                FROM student ")
result = cursor.fetchall()
print(result)
```

Output :

[(592.6,)]

(iv) MAX() AND MIN() FUNCTIONS :

(a) The MAX() function returns the largest value of the selected column.

(b) The MIN() function returns the smallest value of the selected column.

(c) The following example show the highest and least average student's name.

Example :

```
import sqlite3
connection = sqlite3.connect("Organization.
                                db")
cursor = connection.cursor()
```

```
print("Displaying the name of the Highest
                                    Average")
cursor.execute("SELECT
      sname,max(AVERAGE) FROM student ")
result = cursor.fetchall()
print(result)
print("Displaying the name of the Least
                                    Average")
cursor.execute("SELECT
      sname,min(AVERAGE) FROM student ")
result = cursor.fetchall()
print(result)
```

Output :

Displaying the name of the Highest Average
[('PRIYA', 98.6)]
Displaying the name of the Least Average
[('TARUN', 62.3)]

Government Exam Questions and Answers

1 MARK

1. Which is not a SQL clause? *[Govt. MQP-2019]*

(a) GROUP BY
(b) ORDER BY
(c) HAVING
(d) CONDITION **[Ans. (d) CONDITION]**

3 MARKS

1. Write a short note on *[Govt. MQP-2019]*

(i) fetchall() (ii) fetchone()
(iii) fetchmany

Ans. **(i)** cursor.fetchall() - fetchall () method is to fetch all rows from the database table

(ii) cursor.fetchone() - The fetchone () method returns the next row of a query result set or None in case there is no row left.

(iii) cursor.fetchmany() method that returns the next number of rows (n) of the result set

Additional Questions and Answers

Choose the Correct Answer 1 MARK

1. Which of following is fast, flexible and easy to work?

(a) CSV (b) SQlite
(c) Perl (d) Ruby
[Ans. (b) SQlite]

2. Which method is SQlite is used create a connection with a database file created?

(a) cursor () (b) lite ()
(c) connect () (d) connection ()
[Ans. (c) connect ()]

3. Which method has a major role in working with python?

(a) cursor ()
(b) connect ()
(c) execute ()
(d) close
[Ans. (a) cursor ()]

4. The SQlite command opens the already created database is

(a) Cursor (b) Sql-comm
(c) Connect (d) Connection
[Ans. (c) Connect]

5. Which of the following is a command to open the already created database from the statement connection = sqlite3.connect ("ABC.db")

(a) ABC.db (b) connect
(c) SQlite3 (d) connection
[Ans. (b) connect]

6. Which of the following is used define a SQL command in SQlite3?

(a) " " (b) " " " "
(c) ' ' (d) " " " " " "
[Ans. (d) " " " " " "]

7. A table column will be automatically auto incremented in SQlite3 by giving

(a) KEY
(b) PRIMARY KEY
(c) PRIMARY COLUMN
(d) KEY PRIMARY
[Ans. (c) PRIMARY COLUMN]

8. The command to populate the table is

(a) ADD (b) APPEND
(c) INSERT (d) ADDROW
[Ans. (c) INSERT]

9. Which of the following statement in SQL is used to retrieve or fetch data from a table in a database?

(a) select (b) inset
(c) create (d) fetch
[Ans. (a) select]

10. Which sqlite method is used to fetch all rows from the database table?
(a) fetch () (b) fetchrowsAll ()
(c) fectchmany () (d) fetchall ()
[Ans. (d) fetchall ()]

11. Which SQlite method is used to fetch the required number of rows in the database table?
(a) fetch () (b) fetchamany ()
(c) fetchrows () (d) tablerows ()
[Ans. (b) fetchamany ()]

12. Which of the following clause will not work in SQlite?
(a) DISTINCT (b) HAVING
(c) FETCHALL (d) WHERE
[Ans. (c) FETCHALL]

13. Which SQlite keyword is used to fetch only the unique values from the database table?
(a) UNIQUE (b) DISTINCT
(c) GROUPBY (d) HAVING
[Ans. (b) DISTINCT]

14. Which SQlite keyword is used to extract only those records that fulfill a specified condition?
(a) WHERE (b) EXTRACT
(c) CONNECT (d) CURSOR
[Ans. (a) WHERE]

15. Which of the following clause is often used with aggregate functions to group the result?
(a) ORDER BY (b) WHERE
(c) GROUP BY (d) DISTINCT
[Ans. (c) GROUP BY]

16. Which of the following is not an aggregate functions?
(a) SUM (b) COUNT
(c) MAX (d) POW
[Ans. (d) POW]

17. The SQlite clause is used to sort the data in the table is
(a) SORT (b) ORDER BY
(c) GROUP BY (d) ASC SORT
[Ans. (b) ORDER BY]

18. Which SQlite clause is used to filter data base on the group functions?
(a) WHERE (b) HAVING
(c) ORDER (d) FILTER
[Ans. (b) HAVING]

19. In which class the group functions can be used?
(a) WHERE (b) HAVING
(c) DISTINCT (d) GROUP BY
[Ans. (b) HAVING]

20. The WHERE clause cannot be combined with
(a) AND (b) OR
(c) XOR (d) NOT
[Ans. (c) XOR]

21. Which of the following operator cannot be used to filter records based on more than one condition?
(a) AND (b) OR
(c) XOR (d) NOT
[Ans. (d) NOT]

22. Which values cannot be counted?
(a) Integer (b) String
(c) Float (d) Null
[Ans. (d) Null]

23. The command to modify the values in the existing table
(a) MODIFY (b) SELECT
(c) UPDATE (d) CHANGE
[Ans. (c) UPDATE]

24. How many kinds of placeholders the SQlite3 module supports
(a) 1 (b) 2 (c) 3 (d) 5
[Ans. (b) 2]

25. Which of the following placeholders does the SQlite3 module supports?
(a) q mark style (b) named style
(c) module style (d) a and b
[Ans. (a) q mark style]

26. cursor.description will be stored as a
(a) list (b) set
(c) tuple (d) dictionary
[Ans. (c) tuple]

27. The table's field names can be displayed using
(a) cursor.connect
(b) cursor.execute
(c) cursor.commit
(d) cursor.description
[Ans. (d) cursor.description]

CHOOSE THE ODD MAN OUT

1. (a) count (b) max
   (c) OR (d) SUM **[Ans. (c) OR]**
2. (a) AND (b) OR
   (c) MAX (d) NOT **[Ans. (c) MAX]**
3. (a) COUNT (b) NULL
   (c) AVG (d) SUM
   [Ans. (b) NULL]

CHOOSE AND FILL IN THE BLANKS

1. **_____is a software application for the interaction between users and the databases.**
   (a) CSV (b) Python
   (c) DBMS (d) Sys
   [Ans. (c) DBMS]
2. **_____ program can interact as a user of a SQL database.**
   (a) C++ (b) Python
   (c) Java (d) C
   [Ans. (b) Python]
3. **_____ is a simple relational database system.**
   (a) Cython (b) Boost
   (c) MySQL (d) SQlite
   [Ans. (d) SQlite]
4. **_____ has a native library of SQlite.**
   (a) Python (b) C++
   (c) Java (d) C
   [Ans. (a) Python]
5. **All the SQlite commands will be executed using _____ object.**
   (a) connect (b) cursor
   (c) CSV (d) python
   [Ans. (b) cursor]
6. **_____ method run the SQL command to perform some action.**
   (a) run (b) select
   (c) execution (d) execute
   [Ans. (d) execute]
7. **_____ function returns the number of rows in a table satisfying the criteria specified in the where class?**
   (a) Distinct (b) Count
   (c) Having (d) Counter
   [Ans. (b) Count]
8. **Count () returns _____ if there were no matching rows.**
   (a) 0 (b) 1
   (c) NOT NULL (d) NULL
   [Ans. (a) 0]
9. **_____ SQlite command contain the details of each table column headings**
   (a) cursor.description (b) cursor.connect
   (c) cursor.column (d) cursor.fieldname
   [Ans. (a) cursor.description]
10. **In python, the path of a file can be represented as_____**
    (a) / or \\ (b) \\ or /
    (c) \ or ? (d) // or ?
    [Ans. (a) / or \\]

CHOOSE THE INCORRECT PAIR

1. (a) Group by - Aggregate functions
   (b) order by - Sortind data
   (c) Having - filter data
   (d) where - Max, min
   [Ans. (d) where - Max, min]

CHOOSE THE INCORRECT STATEMENT

1. **Choose the incorrect statement from the following.**
   (i) Distinct keyword is used to fetch only unique values from the table.
   (ii) HAVING Clause in used to extract only those records that fulfill a specified condition.
   (iii) GROUP BY clause groups records into summary columns
   (iv) Group functions cannot be used in WHERE clause.
   (a) i and ii (b) ii and iv
   (c) iii, iv and i (d) ii and iii **[Ans. (d) ii and iii]**
2. **Find the correct answer.**
   (i) count funtions returns the number of rows in a table satisfying the criteria.
   (ii) count returns 0 if there were no matching rows.
   (iii) Null values are counted.
   (a) i, ii - True (b) i, iii - True
   (c) i, ii, iii - True (d) i, ii, iii - False
   [Ans. (a) i, ii - True]

VERY SHORT ANSWERS 2 MARKS

1. What is a cursor in SQL and databases?

Ans. (i) A cursor in SQL and databases is a control structure to traverse over the records in a database. So it's used for the fetching of the results.

(ii) The cursor object is created by calling the cursor() method of connection. The cursor is used to traverse the records from the result set.

2. What is the reason behind defining a SQL command with triple quotes?

Ans. The reason behind the triple quotes is sometime the values in the table might contain single or double quotes.

3. What is master table?

Ans. SQlite_master is the master table which holds the key information about your database tables.

4. How will you sort the data in a table in an ordered way?

Ans. (i) The ORDER BY clause can be used along with the SELECT statement to sort the data of specific fields in an ordered way.

(ii) It is used to sort the result-set in ascending or descending order.

5. What is the use of AND, OR operators combined with WHERE clause?

Ans. (i) The WHERE clause can be combined with AND, OR, and NOT operators.

(ii) The AND and OR operators are used to filter records based on more than one condition.

6. Write a note or cursor. description.

Ans. cursor. description contains the details of each column headings .It will be stored as a tuple and the first one that is 0(zero) index refers to the column name. Using this command you can display the table's Field names.

7. Write the placeholders which supported by SQlite3 module Execute.

Ans. **Execute (sql[, parameters]) :**

(i) Executes a single SQL statement. The SQL statement may be parametrized (i.e. placeholders instead of SQL literals).

(ii) The SQlite3 module supports two kinds of placeholders: question marks? ("qmark style") and named placeholders :name ("named style").

8. How the cursor object is created?

Ans. The cursor object is created by calling the cursor() method of connection. The cursor is used to traverse the records from the result set.

9. How the SQL DISTINCT class is helpful to you?

Ans. The DISTINCT clause is helpful when there is need of avoiding the duplicate values present in any specific columns/table. When we use distinct keyword only the unique values are fetched.

10. List the classes used in the SQL SELECT statement.

Ans. (i) DISTINCT

(ii) WHERE

(iii) GROUP BY

(iv) ORDER BY.

(v) HAVING

SHORT ANSWERS 3 MARKS

1. Explain how the SELECT statement can be used along with GROUP BY class.

Ans. (i) The SELECT statement can be used along with GROUP BY clause.

(ii) The GROUP BY clause groups records into summary rows. It returns one records for each group.

(iii) It is often used with aggregate functions (COUNT, MAX, MIN, SUM, AVG) to group the result-set by one or more columns.

2. Write the sqlite steps to connect the database.

Ans. **Step 1 :** Import sqlite3

Step 2 : Create a connection using connect () method and pass the name of the database File

Step 3 : Set the cursor object cursor = connection. cursor ()

3. Explain how a connect to be made to a database (Academy through python SQlite3.

Ans. # Python code to demonstrate table creation and insertions with SQL

```
# importing module

import sqlite3

# connecting to the database

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

# cursor

cursor = connection.cursor()
```

4. What is the use of aggregate functions used along with SELECT statement? What are they?

Ans. Aggregate functions are used to do operations from the values of the column and a single value is returned.

(i) COUNT()

(ii) AVG()

(iii) SUM()

(iv) MAX()

(v) MIN()

5. What is the purpose of using

(i) COUNT ()

(ii) AVG ()

(iii) SUM ()

(iv) MAX ()

(v) MIN ().

Ans. (i) COUNT() function returns the number of rows in a table.

(ii) AVG() function retrieves the average of a selected column of rows in a table.

(iii) SUM() function retrieves the sum of a selected column of rows in a table.

(iv) MAX() function returns the largest value of the selected column.

(v) MIN() function returns the smallest value of the selected column.

6. Write a note on SELECT statement in SQL.

Ans. (i) "SELECT" is the most commonly used statement in SQL.

(ii) The SELECT Statement in SQL is used to retrieve or fetch data from a table in a database.

(iii) The syntax for using this statement is "**Select * from table_name**" and all the table data can be fetched in an object in the form of list of lists.

☆☆☆

CHAPTER 16

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

CHAPTER SNAPSHOT

EVALUATION

PART - I

CHOOSE THE BEST ANSWER (1 MARK)

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

(a) matplotlib.pyplot (b) matplotlib.pip
(c) matplotlib.numpy (d) matplotlib.plt

[Ans. (a) matplotlib.pyplot]

2. Identify the package manager for Python packages, or modules. *[HY-2019]*

(a) Matplotlib (b) PIP
(c) plt.show() (d) python package

[Ans. (b) PIP]

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

[Ans. (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

[Ans. (a) List installed packages]

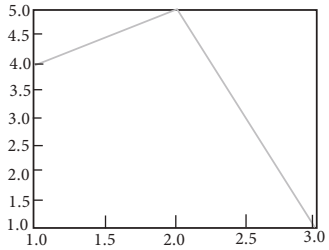
5. To install matplotlib, the following function will be typed in your command prompt. What does "-U"represents?

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

[Ans. (b) upgrading pip 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()

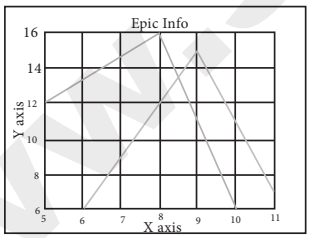
(d) import matplotlib.pyplot as plt
plt.plot([1,3],[4,1])
plt.show()

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

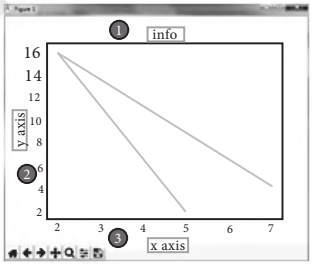
7. **Read the code:**

(a) import matplotlib.pyplot as plt
(b) plt.plot(3,2) (c) plt.show()
Identify the output for the above coding.

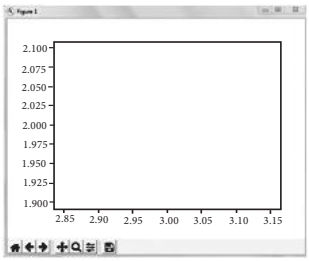
(a)



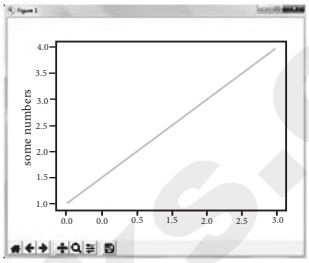
(b)

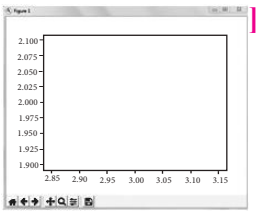


(c)



(d)



[Ans. (c)  **]**

8. **Which key is used to run the module?**

(a) F6 (b) F4 (c) F3 (d) F5

[Ans. (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

[Ans. (a) Line chart]

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

[Ans. (c) Both the statements are correct]

PART - II
ANSWER THE FOLLOWING QUESTIONS
(2 MARKS)

1. Define: Data Visualization. *[HY-2019]*

Ans. Data Visualization is the graphical representation of information and data. The objective of Data Visualization is to communicate information visually to users. For this, data visualization uses statistical graphics. Numerical data may be encoded using dots, lines, or bars, to visually communicate a quantitative message.

2. List the general types of data visualization.

Ans.
(i) Charts
(ii) Tables
(iii) Graphs
(iv) Maps
(v) Infographics
(vi) Dashboards

3. List the types of Visualizations in Matplotlib.

Ans. There are many types of Visualizations under Matplotlib. Some of them are :
(i) Line plot
(ii) Scatter plot
(iii) Histogram
(iv) Box plot
(v) Bar chart and
(vi) Pie chart

4. How will you install Matplotlib?

Ans.
(i) Matpotlib can be installed using pip software.
(ii) Pip is a management software for installing python packages.
(iii) Importing Matplotlib using the command : import matplotlib.pyplot as plt
(iv) Matplotlib can be imported in the workspace.

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

Ans.

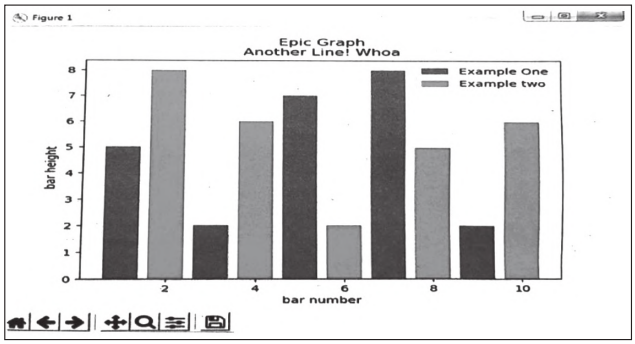
plt.plot([1,2,3,4])	plt.plot([1,2,3,4], [1,4,9,16])
After installing Matplotlib, we will begin coding by importing Matplotlib using the command: import matplotlib. pyplot as plt Now you have imported Matplotlib in your workspace. You need to display the plots. Using Matplotlib from within a Python script, you have to add plt.show() method inside the file to display your plot.	A single list or array provided to the plot () command, matplotlib assumes it is a sequence of y values, and automatically generates the x values for you. Since python ranges start with 0, the default x vector has the same length as y but starts with 0. Hence the x data are [0, 1, 2, 3]. plot() is a versatile command, and will take an arbitrary number of arguments. This .plot takes many parameters, but the first two here are 'x' and 'y' coordinates. This means, you have 4 co-ordinates according to these lists: (1,1), (2,4), (3,9) and (4,16).

PART - III
ANSWER THE FOLLOWING QUESTIONS
(3 MARKS)

1. Draw the output for the following data visualization plot. *[Govt. MQP-2019]*

```
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()
```

Ans.



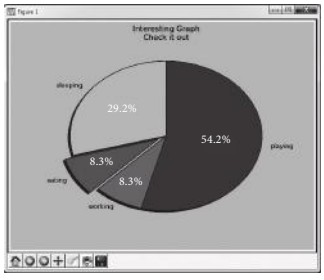
2. Write any three uses of data visualization. *[PTA-1, 5; HY-2019]*

Ans.
(i) Data Visualization help users to analyze and interpret the data easily.
(ii) It makes complex data understandable and usable.
(iii) Various Charts in Data Visualization helps to show relationship in the data for one or more variables.

3. Write the coding for the following:
a. To check if PIP is Installed in your PC.
b. To Check the version of PIP installed in your PC.
c. To list the packages in matplotlib.

Ans.
a. To check if PIP is Installed in your PC :
(i) In command prompt type pip – version.
(ii) If it is installed already, you will get version.
(iii) **Command :** Python - m pip install - U pip.
b. To Check the version of PIP installed in your PC :
C:\Users\YourName\AppData\Local\Programs\Python\Python36-32\Scripts>pip-version.
c. To list the packages in matplotlib :
C:\Users\YourName\AppData\Local\Programs\Python\Python36-32\Scripts>pip list

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



Ans.
```
import matplotlib.pyplot as plt
slices = [7, 2, 2, 13]
activities = ["sleeping", "eating", "working", "playing", ]
plt.pie (slices, labels = activities, autopct = 'y.1.1f%%)
plt.title ("Interesting Graph Check it out")
plt.show()
```

PART - IV

ANSWER THE FOLLOWING QUESTIONS

(5 MARKS)

1. Explain in detail the types of pyplots using Matplotlib. *[PTA-6]*

Ans. Matplotlib allows you to create different kinds of plots ranging from histograms and scatter plots to bar graphs and bar charts.

Line Chart :

(i) 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.

(ii) 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.

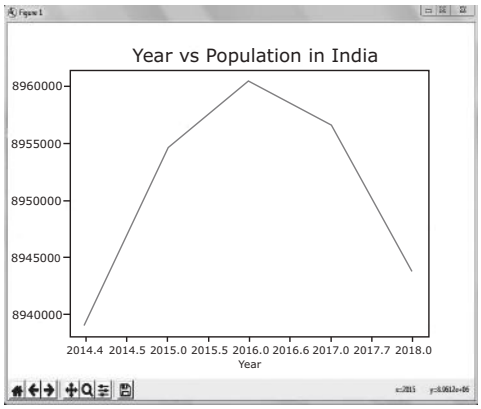
(iii) **Example**

Program for Line plot :

```
import matplotlib.pyplot as plt
years = [2014, 2015, 2016, 2017, 2018]
total_populations = [8939007, 8954518, 8960387, 8956741, 8943721]
plt.plot (years, total_populations)
plt.title ("Year vs Population in India")
plt.xlabel ("Year")
plt.ylabel ("Total Population")
plt.show()
```

In this program,
Plt.title() → specifies title to the graph
Plt.xlabel() → specifies label for X-axis
Plt.ylabel() → specifies label for Y-axis

Output :



Bar Chart :

(i) 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.

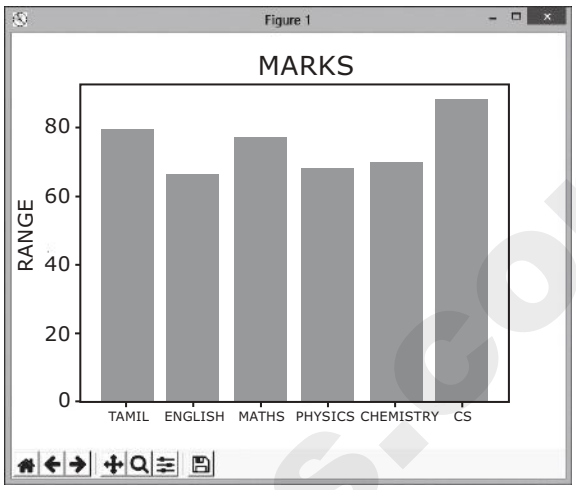
(ii) Bar chart represents categorical data with rectangular bars. Each bar has a height corresponds to the value it represents. The bars can be plotted vertically or horizontally.

(iii) 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.

(iv) **Example :**

```
import matplotlib.pyplot as plt
# Our data
labels = ["TAMIL", "ENGLISH", "MATHS",
          "PHYSICS", "CHEMISTRY", "CS"]
usage = [79.8, 67.3, 77.8, 68.4, 70.2, 88.5]
# Generating the y positions. Later, we'll
    use them to replace them with labels.
y_positions = range (len(labels))
# Creating our bar plot
plt.bar (y_positions, usage)
plt.xticks (y_positions, labels)
plt.ylabel ("RANGE")
plt.title ("MARKS")
plt.show()
```

Output :



Pie Chart :

(i) 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.

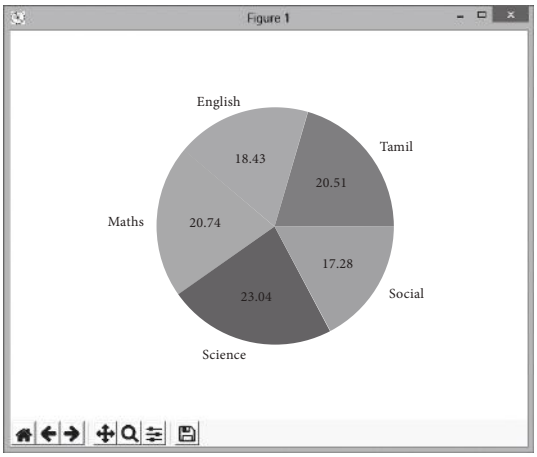
(ii) The point of a pie chart is to show the relationship of parts out of a whole. To make a Pie Chart with Matplotlib, we can use the plt.pie() function.

(iii) The autopct parameter allows us to display the percentage value using the Python string formatting.

(iv) **Example :**

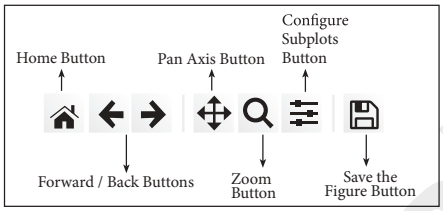
```
import matplotlib.pyplot as plt
sizes = [89, 80, 90, 100, 75]
labels = ["Tamil", "English", "Maths",
          "Science", "Social"]
plt.pie (sizes, labels = labels, autopct =
          "%.2f")
plt.axes().set_aspect ("equal")
plt.show()
```

Output :



2. Explain the various buttons in a matplotlib window. *[PTA-5]*

Ans. **Buttons in the output :** In the output figure, you can see few buttons at the bottom left corner. Let us see the use of these buttons.



(i) **Home Button** → The Home Button will help one to begun navigating the chart. If you ever want to return back to the original view, you can click on this.

(ii) **Forward/Back buttons** → These buttons can be used like the Forward and Back buttons in browser. Click these to move back to the previous point you were at, or forward again.

(iii) **Pan Axis** → This cross-looking button allows you to click it, and then click and drag graph around.

(iv) **Zoom** → The Zoom button lets you click on it, then click and drag a square would like to zoom into specifically. Zooming in will require a left click and drag. Zoom out with a right click and drag.

(v) Configure Subplots → This button allows you to configure various spacing options with figure and plot.

(vi) Save Figure → This button will allow you to save figure in various forms.

3. Explain the purpose of the following functions:

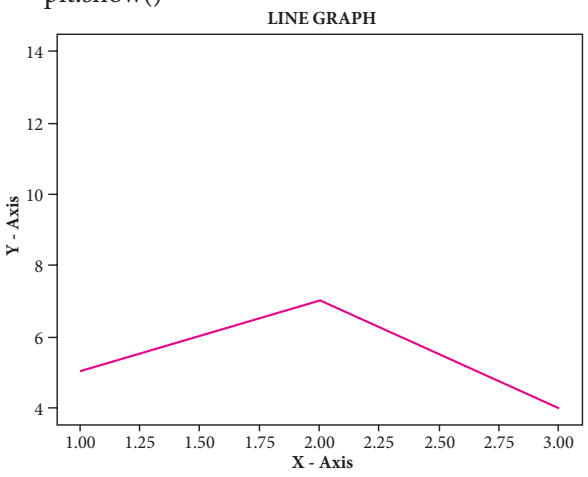
a. **plt.xlabel**
b. **plt.ylabel**
c. **plt.title**
d. **plt.legend()**
e. **plt.show()**

Ans.
a. Specifies label for x-axis
b. Specifies label for y-axis
c. Specifies title to the graph or assigns the plot title.
d. Invoke the default legend with plt
e. Display the plot

Hands on Experience

1. Create a plot. Set the title, the x and y labels for both axes.

Ans.
```
import matplotlib.pyplot as plt
x = [1, 2, 3]
y = [5, 7, 4]
plt.plot(x,y)
plt.xlabel('x-axis')
plt.ylabel('y-axis')
plt.title('LINE GRAPH')
plt.show()
```



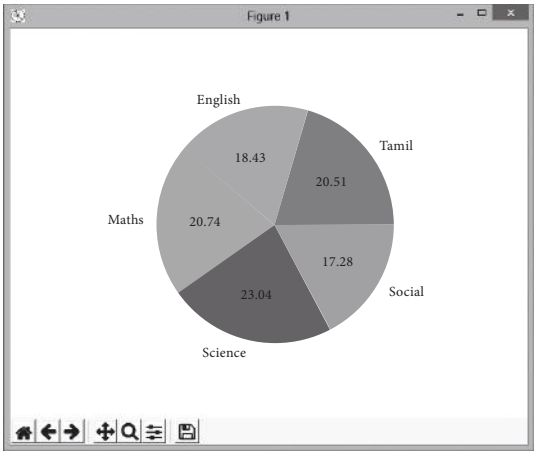
2. Plot a pie chart for your marks in the recent examination.

Ans. Example :

```
import matplotlib.pyplot as pit
sizes = [89, 80, 90, 100, 75]
labels = ["Tamil", "English", "Maths", "Science",
                                    "Social"]
```

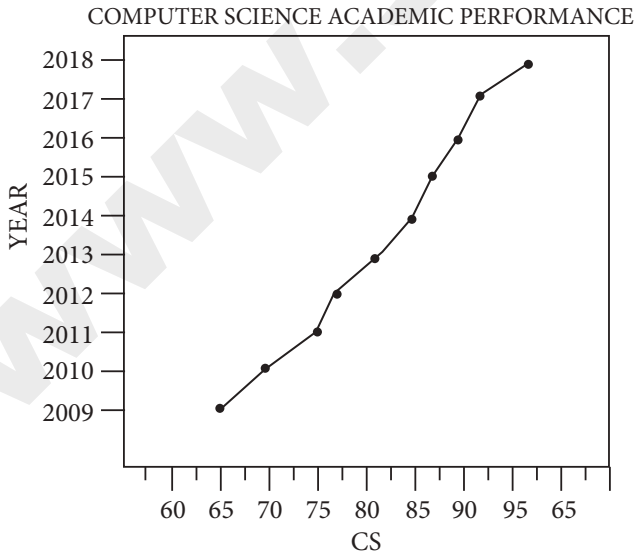
```
plt.pie(sizes, labels = labels, autopct = "%.ef")
plt.axes().set_aspect("equal")
plt.show()
```

Output :



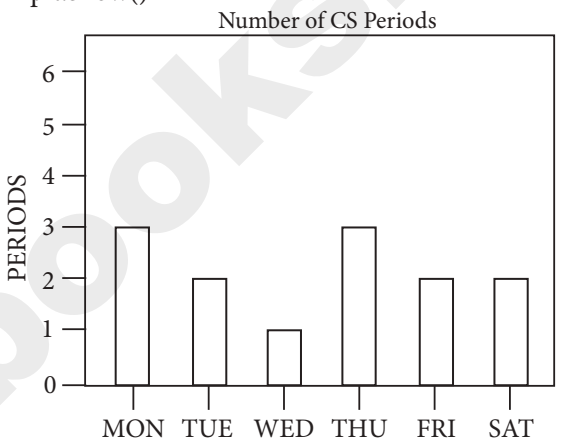
3. Plot a line chart on the academic performance of Class 12 students in Computer Science for the past 10 years.

Ans.
```
import matplotlib.pyplot as plt
years = [2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018]
cs = [65, 70, 75, 76, 78, 80, 82, 85, 87, 92]
plt.plot(years,cs)
plt.title("COMPUTER SCIENCE ACADEMIC PERFORMANCE")
plt.xlabel("cs")
plt.ylabel('years")
plt.show()
```



4. Plot a bar chart for the number of computer science periods in a week.

Ans.
```
import matplotlib.pyplot as plt
labels = ["MON", "TUE", "WED", "THUR", "FRI", "SAT",]
usage = [3, 2, 1, 3, 2, 2]
y_positions = range (len(labels))
plt.bar(y_positions, usage)
plt.xticks(y_positions, labels)
plt.ylabel("PERIODS")
plt.ylabel("years")
plt.title("NO. OF CS PERIODS")
plt.show()
```



PTA Questions and Answers

1 MARK

1. The most popular data visualization library which allows creating charts in few line of code in Python. *[PTA-1]*

(a) Matplotlib (b) Infographics
(c) Data visualization (d) pip

[Ans. (a) Matplotlib]

2. The function to make a pie chart with Matplotlib: *[PTA-2]*

(a) plt.bar() (b) pie.plt()
(c) bar.plt() (d) plt.pie()

[Ans. (d) plt.pie()]

3. Which of the following is not a type of visualization under matplotlib? *[PTA-3]*

(a) Histogram (b) Pie chart
(c) Box plot (d) SQLite

[Ans. (d) SQLite]

4. _____ plot is a type of plot that shows the data as a collection of points. *[PTA-4]*

(a) Line (b) Scatter
(c) Box (d) Pie

[Ans. (b) Scatter]

5. Which of the following matplotlib function is used to draw line chart? *[PTA-5]*

(a) pie() (b) line()
(c) bar() (d) plot()

[Ans. (b) line()]

6. In Line Chart or Line Graph displays information as a series of data points called _____. *[PTA-6]*

(a) Markers (b) Points
(c) Dots (d) Lines

[Ans. (a) Markers]

2 MARKS

1. What is Matplotlib? *[PTA-2]*

Ans. Matplotlib is the most popular data visualization library in Python. It allows to create charts in few lines of code.

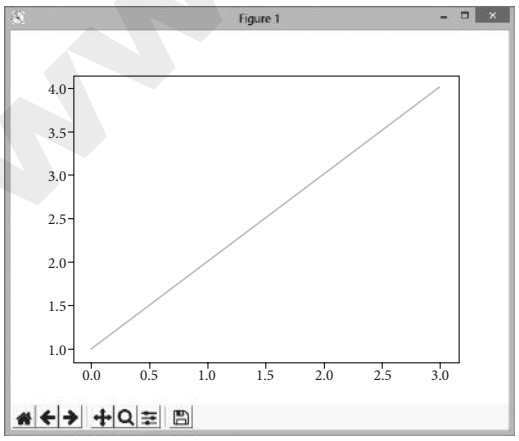
2. Draw the chart for the given Python snippet. *[PTA-4]*

```
import matplotlib.pyplot as plt
plt.plot([1, 2, 3, 4], [1, 4, 9, 16])
plt.show()
```

Ans. **Program :**

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

Output :



3. What is Pip? *[PTA-6]*

Ans. Matplotlib installed using pip. Pip is a management software for installing python packages.

3 MARKS

1. What is pie chart? How will you create pie chart in Python? Give an example. *[PTA-3]*

Ans. **Pie Chart**

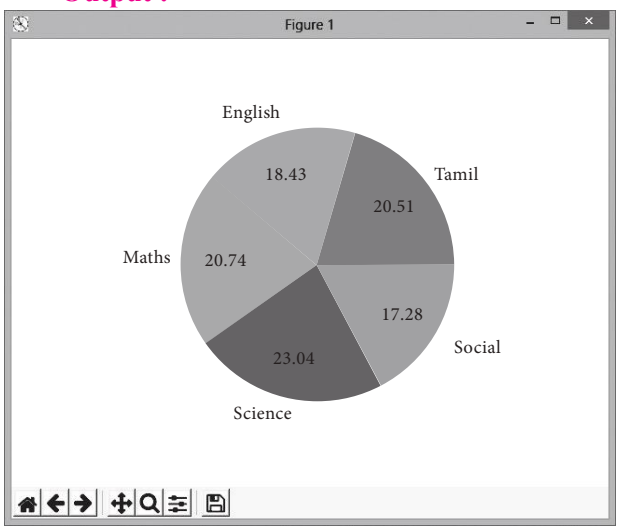
(i) Pie Chart is probably one of the most common type of chart. It is a circular graphic which is divided into slices to illustrate numerical proportion. The point of a pie chart is to show the relationship of parts out of a whole.

(ii) 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.

Example :

```
import matplotlib.pyplot as plt
sizes = [89, 80, 90, 100, 75]
labels = ["Tamil", "English", "Maths", "Science",
          "Social"]
plt.pie (sizes, labels = labels, autopct = "%.2f ")
plt.axes().set_aspect ("equal")
plt.show()
```

Output :

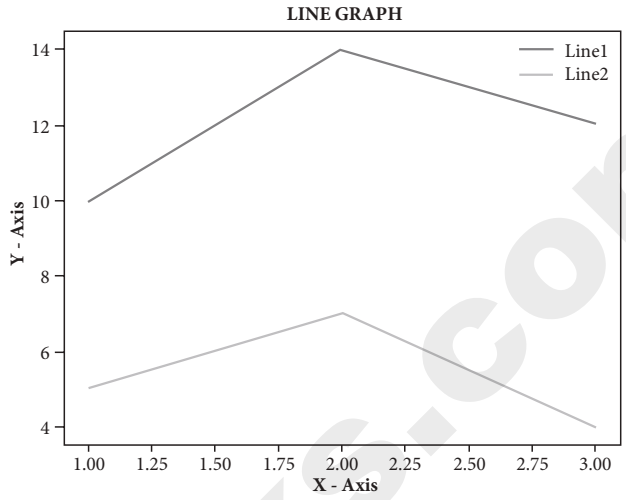


5 MARKS

1. **Draw the output for the following Python code.** *[PTA-3]*

```
import matplotlib.pyplot as plt
a = [1, 2, 3]
b = [5, 7, 4]
x = [1, 2, 3]
y = [10, 14, 12]
plt.plot(a,b, label='Lable 1')
plt.plot(x,y, label='Lable 2')
plt.xlabel('X-Axis')
plt.ylabel('Y-Axis')
plt.legend()
plt.show()
```

Ans.



2. **What are the key differences between Histogram and Bar graph?** *[PTA-4]*

Ans.

	Histogram	Bar graph
(i)	Histogram refers to a graphical representation; that displays data by way of bars to show the frequency of numerical data.	A bar graph is a pictorial representation of data that uses bars to compare different categories of data.
(ii)	A histogram represents the frequency distribution of continuous variables.	Conversely, a bar graph is a diagrammatic comparison of discrete variables.
(iii)	Histogram presents numerical data.	Bar graph shows categorical data.
(iv)	Items of the histogram are numbers, which are categorised together, to represent ranges of data.	As opposed to the bar graph, items are considered as individual entities.
(v)	A histogram, this cannot be done, as they are shown in the sequence of classes.	In the case of a bar graph, it is quite common to rearrange the blocks, from highest to lowest.
(vo)	The width of rectangular blocks in a histogram may or may not be same	The width of the bars in a bar graph is always same.

Government Exam Questions and Answers

1 MARK

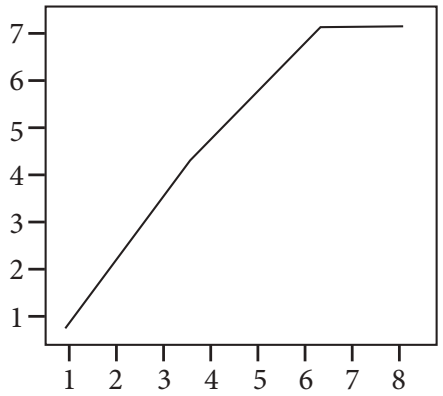
1. **To make a bar chart with Matplotlib, which function should be used?** *[Govt. MQP-2019]*

(a) plt.bar() (b) plt.chart()
(c) pip.bar() (d) pip.chart()

[Ans. (a) plt.bar()]

3 MARKS

1. **Write a Python code to display the following chart.** *[Govt. MQP-2019]*



Ans. import matplotlib.pyplot as plt

```
plt.plot([1,2,3,4])
plo.show()
```

Output :

This window is a matplotlib window, which allows you to see your graph. You can hover the graph and see the coordinates in the bottom right.

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. **Which kind of data encoded visually communicate a quantitative message?**
(a) String (b) Numbers
(c) Images (d) None of these
[Ans. (b) Numbers]

2. **The numerical data is encoded using**
(a) dots (b) lines
(c) bars (d) all of these
[Ans. (d) all of these]

3. **Which of the following is not a type of Data Visualization?**
(a) Graphs (b) Picture
(c) Maps (d) Infographics
[Ans. (b) Picture]

4. **Which of the following is the representation of information in a graphic format?**
(a) Info graphics (b) Graphics
(c) Dashboard (d) Charts
[Ans. (a) Info graphics]

5. **Which of the following is a collection of resources assembled to create a single unified visual display?**
(a) Info graphics (b) Dashboard
(c) Graphics (d) Chats
[Ans. (b) Dashboard]

6. **Which of the following translate complex ideas and concepts into a simple visual format?**
(i) Data visualization (ii) Dashboards
(iii) Tables (iv) Maps
(a) i, iii (b) iii, ii (c) i, iv (d) i, ii
[Ans. (d) i, ii]

7. **In Python matplotlib is a**
(a) control structure (b) dictionary
(c) library (d) list
[Ans. (c) library]

8. **Matplotlib allows you to create a**
(a) Table (b) Charts
(c) Maps (d) Info graphics
[Ans. (b) Charts]

9. **How many types of visualizations are there under matplotlib?**
(a) 6 (b) 4
(c) 5 (d) Many
[Ans. (d) Many]

10. **Which of following is not a visualization under matplotlib?**
(a) Scatter plot (b) Table plot
(c) Histogram (d) Box plot
[Ans. (b) Table plot]

11. **Which plot displays the distribution of data based on the five number summary?**
(a) Scatter plot (b) Line plot
(c) Box plot (d) Chart plot
[Ans. (c) Box plot]

12. **Which of the following is not a five number summary in box plot visualization?**
(a) First Quartile (b) Second Quartile
(c) Third Quartile (d) Minimum
[Ans. (b) Second Quartile]

13. **Which of the following is a management software for installing python package?**
(a) pip (b) plot
(c) matplotlib (d) plot lib
[Ans. (c) matplotlib]

14. Which of the following command is used to install matplotlib for coding?

(a) import plt.matplotlib as plot
(b) import plot.matplotlib as plt
(c) import matplotlib.plt as plot
(d) import matplotlib.pyplot as plt

[Ans. (d) import matplotlib.pyplot as plt]

15. Which of the following method will be add inside the file to display plot?

(a) show ()
(b) display ()
(c) execute ()
(d) plot ()

[Ans. (a) show ()]

16. The default x.vector has the same length of y but starts with

(a) 3 (b) 2 (c) 1 (d) 0

[Ans. (d) 0]

17. Which of the following command will take an arbitrary number of arguments?

(a) show ()
(b) plot ()
(c) legend ()
(d) title ()

[Ans. (b) plot()]

18. Which button will help to navigate the chart?

(a) Navigate
(b) Pan
(c) Home
(d) Zoom

[Ans. (c) Home]

19. Which button used to click and drag a graph around?

(a) pan
(b) home
(c) zoom
(d) drag

[Ans. (a) pan]

20. Which button allows to configure various spacing options with figure?

(a) configure plots
(b) configure subplots
(c) subplots configure
(d) plots configure

[Ans. (b) configure subplots]

21. The different kinds of plot created using

(a) Matplotlib
(b) Matplot
(c) Plotlib
(d) Matliplot

[Ans. (a) Matplotlib]

22. Which type of charts displays information as series of data points?

(a) Bar
(b) Pie
(c) Line
(d) Histogram

[Ans. (c) Line]

23. A line chart is type of chart which displays on formats as a data points called

(a) series
(b) markers
(c) plot
(d) lib

[Ans. (b) markers]

24. Which type of chart shows the relationship between a numerical variable and categorical variable?

(a) line
(b) bar
(c) pie
(d) x-y plot

[Ans. (b) bar]

25. Which refers to a graphical representation that displays data by way of bars to show the frequency of numerical data?

(a) Bar chart
(b) Barch graph
(c) Pie chart
(d) Histogram

[Ans. (d) Histogram]

26. Which of the following chart represents the frequency distribution of continuous variables?

(a) Histogram
(b) Pie
(c) Line
(d) Bar

[Ans. (a) Histogram]

27. Which of the following one indicates discontinuity?

(a) Histogram
(b) Pie
(c) Bar graph
(d) None of these

[Ans. (c) Bar graph]

28. Which of the following plot we cannot rearrange the blocks from highest to lowest?

(a) Line
(b) Bar chart
(c) Pie chart
(d) Histogram

[Ans. (d) Histogram]

29. In which plot the width of the bars is always same?

(a) Line
(b) Bar chat
(c) Pie chart
(d) Histogram

[Ans. (b) Bar chat]

30. In which plot the width of the bars may or may not be same?

(a) Histogram
(b) Pie chat
(c) Bar chat
(d) Line

[Ans. (a) Histogram]

31. Which plot is a circular graphical representation of numerical data?
(a) Histogram (b) xy plot
(c) Bar plot (d) Pie chart
[Ans. (d) Pie chart]

32. Which parameter used to display() the percentage value using Python string formatting in pie chart?
(a) percent (b) autopct
(c) pct (d) percentage
[Ans. (b) autopct]

Choose and fill in the blanks

1. Data visualization used _____ graphics.
(a) 2D (b) 3D
(c) Statistical (d) Image
[Ans. (c) Statistical]

2. ____ is the graphical representation of information and data.
(a) Data visualization (b) Data Graphics
(c) Data Dimension (d) Data Images
[Ans. (a) Data visualization]

3. _____ in data visualization helps to show relationship in the data for more variables.
(a) Tables (b) Graphics
(c) Charts (d) Dashboards
[Ans. (c) Charts]

4. In Scatter plot, the position of a point depends on its _____ value.
(a) 2 – Dimensional (b) 3 – Dimensional
(c) 1 – Dimensional (d) 7 – Dimensional
[Ans. (a) 2 – Dimensional]

5. If a list given to the plot () command, matplotlib assumes it is a sequence of _____ values.
(a) x (b) y (c) 0 (d) 4
[Ans. (b) y]

6. Zoom in will require _____ and drag.
(a) click (b) left click
(c) double click (d) right click
[Ans. (b) left click]

7. Zoom out will require _____ and drag.
(a) click
(b) left click
(c) double click
(d) right click **[Ans. (d) right click]**

8. _____ and _____ are the two ways to display data in the form of diagram.
(a) Line chart, Pie chart
(b) Line chart, Bar chart
(c) Bar Graph, Histogram
(d) Line chart, Histogram
[Ans. (c) Bar Graph, Histogram]

Very Short Answers 2 MARKS

1. What is Infographics data visualization?

Ans. **Infographics** → An infographic (information graphic) is the representation of information in a graphic format.

2. Write a note on Dashboard.

Ans. **Dashboard** → A dashboard is a collection of resources assembled to create a single unified visual display. Data visualizations and dashboards translate complex ideas and concepts into a simple visual format. Patterns and relationships that are undetectable in text are detectable at a glance using dashboard.

3. Which plot shows the data as a collection of points? Explain or write a note on scatter plot.

Ans. **Scatter plot :** A scatter plot is a type of plot that shows the data as a collection of points. The position of a point depends on its two-dimensional value, where each value is a position on either the horizontal or vertical dimension.

4. Write note or Box plot.

Ans. **Box plot :** The box plot is a standardized way of displaying the distribution of data based on the five number summary: minimum, first quartile, median, third quartile, and maximum.

5. What are the two ways to display data in the form of diagram?

Ans. Bar Graph and Histogram are the two ways to display data in the form of a diagram.

Short Answers 3 MARKS

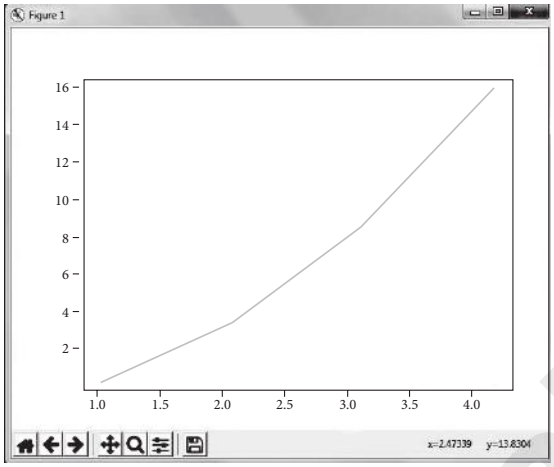
1. Write a python code to display the following plot.

Ans. **Program :**

For example, to plot x versus y, you can issue the command:

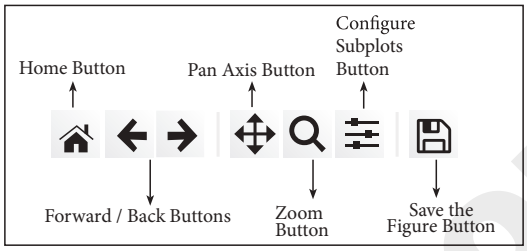
```
import matplotlib.pyplot as plt
plt.plot([1,2,3,4], [1,4,9,16])
plt.show()
```

Output :



2. List the buttons in matlibplot window.

Ans.



3. Read the following code. What does the following represents.

(i) Labels
(ii) Usage
(iii) X ticks
(iv) Range
(v) Show

Ans.

(i) Labels → Specifies labels for the bars.

(ii) Usgae → Assign values to the labels specified.

(iii) Xticks → Display the tick marks along the x-axis at the values represented. Then specify the label for each tick mark.

(iv) Range → Create sequence of numbers.

(v) Show → Displays the plot

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12th STD. Govt. Model Question Paper - 2019-20
Computer Science

Time : 3.00 Hours ✶] as per Govt. Notifications [Maximum Marks : 70

Instructions :

(a) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor Immediately.

(b) Only **Blue** or **Black** ink must be used to write and underline. Pencil can be used to draw the diagrams.

PART - I

Note : (i) All questions are compulsory. **[15 × 1 = 15]**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code with the corresponding answer.

1. Bundling two values together into one can be considered as

(a) Pair (b) Triplet
(c) Single (d) Quadrat

2. The kind of scope of the variable *'a'* used in the pseudo code given below

(A) Disp():
(B) a:=7
(C) print a
(D) Disp()

(a) Local (b) Global
(c) Enclosed (d) Built-in

3. Big Ω is the reverse of

(a) Big O (b) Big Θ
(c) Big A (d) Big S

4. Extension of Python files is

(a) .Pyt (b) .txt (c) .Pdm (d) .Py

5. The output of the Segment

```
for i in range (10, 0, 2)
    Print(i)
```

is

(a) 10 8 6 4 2 0 (b) 10 8 6 4 2
(c) 0 2 4 6 8 10 (d) Error

6. The bin( ) function returns a binary string prefixed with:

(a) 0 (b) 1 (c) 0b (d) 1b

7. The positive and negative index values of 'P' in the string Str1='COMPUTER' are

(a) 3, –4 (b) 4, –4
(c) 3, –5 (d) 4, –5

8. 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

9. A variable prefixed with double underscore is

(a) private (b) public
(c) protected (d) static

10. The data model developed by IBM is

(a) Hierarchical (b) Relational
(c) Network (d) ER

11. The SQL command to make a database as current active database is

(a) CURRENT (b) USE

(c) DATABASE (d) NEW

12. 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

13. The function call statement of the segment.

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

is

(a) main(sys.argv[1:]) (b) __name__

(c) __main__ (d) argv

14. Which is not a SQL clause?

(a) GROUP BY (b) ORDER BY

(c) HAVING (d) CONDITION

15. To make a bar chart with Matplotlib, which function should be used?

(a) plt.bar( ) (b) plt.chart( )

(c) pip.bar( ) (d) pip.chart( )

PART - II

Answer any six questions. Question No. 21 is compulsory. **6 × 2 = 12**

16. What do you mean by Namespaces?

17. What is searching? Write its types.

18. Define Operator and Operand.

19. What are the types of looping supported by Python?

20. What is the use of the operator + = in Python string operation?

21. What will be the output of the following snippet?

```
alpha=list(range(65, 70))
for x in alpha:
    print(chr(x), end='\t')
```

22. What is the use of WHERE clause in SQL?

23. What are the steps involved in file operation of Python?

24. Distinguish compiler and interpreter.

PART - III

Answer any six questions. Question No. 29 is compulsory. **6 × 3 = 18**

25. Why strlen is called pure function?

26. Which strategy is used for program designing? Define the strategy.

27. Which jump statement is used as placeholder? Why?

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

29. 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
```

30. 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('Tamil Nadu')
obj.display()
```

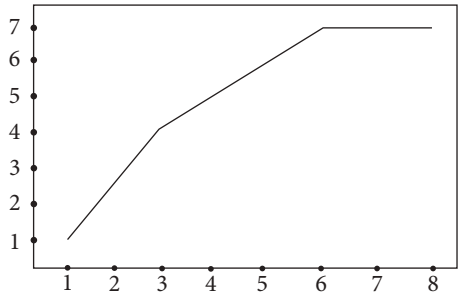
31. Explain Cartesian product with a suitable example.

32. Write a short note on

(i) fetchall( ) (ii) fetchone( )

(iii) fetchmany( )

33. Write a Python code to display the following chart.



PART - IV

Answer all the questions:. **5 × 5 = 25**

34. (a) Write any five benefits in using modular programming.

(OR)

(b) Explain input( ) and print ( ) functions of Python with example.

35. (a) Write a detail note on for loop in Python.

(OR)

(b) Example the different types of functions in Python with example.

36. (a) Explain about the find( ) function in Python with example.

(OR)

(b) Compare remove( ), pop( ) and clear( ) function in Python.

37. (a) Explain the components of DBMS.

(OR)

(b) What are the components of SQL? Write the commands in each.

38. (a) Explain the following operators in Relational Algebra with suitable example

(1) Union. (∪)

(2) Intersection (∩)

(OR)

(b) Draw the output for the following data visualization plot.

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

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12th STD. Common Quarterly Examination - 2019

PART - III

Reg. No. | | | | | | |

Time : 3.00 Hours] **Computer Science** [Maximum Marks : 70

Instructions :

(a) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(b) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams

PART - I

Note : (i) Answer all questions. **[15 × 1 = 15]**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. The Variables in a function definition are called as

(a) Subroutines (b) Function
(c) Definition (d) Parameters

2. The data type whose representation is known are called

(a) Built-in datatype
(b) Derived data type
(c) Concrete data type
(d) Abstract data type

3. Containers for mapping names of variables to objects is _____

(a) Name Spaces (b) Scope
(c) Mapping (d) Binding

4. What is another name of Binary search?

(a) Linear
(b) Half interval
(c) Decimal
(d) Boolean

5. How many ways python program can be written?

(a) 2 (b) 4 (c) 3 (d) 1

6. _____ separation is necessary between tokens.

(a) ; (b) Delimiter
(c) White Space (d) :

7. Which is optional part in range ( ) function?

(a) end (b) step
(c) stop (d) start

8. What is the output of the following program.

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

(a) 1 (b) 0 (c) none (d) C

9. Which command deletes the elements and it retains list

(a) remove ( ) (b) del ( )
(c) Clear ( ) (d) Pop ( )

10. What is the output of the function Print (Chr(66))?

(a) A (b) C (c) b (d) B

11. _____ is the mixed collection of elements.

(a) Lists (b) Sets
(c) Dictionary (d) Tuples

12. Which of the following method is used as destructor?

(a) __dest__( ) (b) __del__( )
(c) __int__( ) (d) __rem__( )

13. Which model database created by dividing the object into entity and its Characteristics into attributes?

(a) Hierarchical (b) Relational
(c) Network (d) ER data base

14. The Original version of SQL is released in the year.....

(a) 1970 (b) 1980
(c) 1986 (d) 1992

15. Which command saves any transaction in database permanently?
(a) save (b) save point
(c) commit (d) roll back

PART - II

Answer any 6 questions. Q.No. 24 is compulsory. **6 × 2 = 12**

16. Define pure function. Give one example.
17. What is List? Give an example.
18. What is LEGB rule?
19. Write short notes on floor division operator.
20. Write a program to display the sum of n natural numbers.
21. Describe the abs ( ) and chr ( ) function.
22. What is a Set? Give example.
23. List the types of database model.
24. Define primary key Constraint.

PART - III

Answer any 6 questions. Q.No. 33 is compulsory. **6 × 3 = 18**

25. Write an algorithmic function definition to find the minimum among 3 numbers.
26. Differentiate Constructors and Selectors.
27. Write a note on Asymptotic notation.
28. Write a syntax of while loop.
29. Evaluate the following function.
a) math.ceil (3.5) b) abs (–3.2) c) Pow (2,0)
30. What is the use of format ( ) function? Give an example.
31. What is reverse indexing in List?
32. Write the difference between SELECT and PROJECT Command.
33. What is Constructor?

PART - IV

Answer all the questions:. **5 × 5 = 25**

34. (a) Explain the selection Sort Algorithm with an example.

(OR)

(b) Discuss in detail about Tokens in python.

35. (a) Write a program to check the given character is a vowel or not.

(OR)

(b) Explain various function arguments in Python.

36. (a) Explain the following function.
a) id( ) b) type ( ) c) lower ( )
d) max ( ) d) min ( )

(OR)

(b) Write a python program to check whether the given string is palindrome or not

37. (a) Explain the different SET operations in python.

(OR)

(b) How will you create the class, and objects in python.

38. (a) Write the output for the following program.

```
str="COMPUTER"
index=0
for i in str:
    print(str[: index+1])
    index + = 1
```

(OR)

(b) Explain the following commands in SQL language.
a) CREATE
b) SELECT
c) DELETE
d) ALTER
e) DROP

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12th STD. Half Yearly Examination - 2019

PART - III

Reg. No. | | | | | | |

Time : 3.00 Hours] **Computer Science** [Maximum Marks : 70

Instructions :

(a) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor Immediately.

(b) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART - I

Note : (i) Answer all the questions. **[15 × 1 = 15]**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

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

(a) Arguments

(b) Subroutines

(c) Function

(d) Function definition

2. The datatype whose representation is unknown is called

(a) Built-in datatype

(b) Derived datatype

(c) Concrete datatype

(d) Abstract datatype

3. Which of the following is used in programming languages to map the variable and object?

(a) : : (b) : =

(c) = (d) = =

4. In dynarnic programming, the technique of storing the previously calculated values is called.

(a) Saving value property

(b) Storing value property

(c) Memorization

(d) Mapping

5. Which of the following is not a Relational operator?

(a) = (b) = = (c) > = (d) < =

6. Which statement is used to skip the remaining part of a loop and start with next iteration?

(a) break (b) continue

(c) return (d) goto

7. Evaluate the following function and write the output

```
x = –37.9
print(math.ceil(x))
```

(a) –38 (b) –39 (c) –36 (d) –37

8. Defining strings within triple quotes allows creating

(a) Single line string

(b) Multiline strings

(c) Double line strings

(d) Multiple strings

9. Which of the following statement is not correct?

(a) The extend( ) function is used in tuple to add elements in a list.

(b) The append( ) function is used to add an element.

(c) A tupe is immutable.

(d) A list is mutable.

10. The process of creating an object is called as
(a) Constructor (b) Destructor
(c) Initialize (d) Instantiation

11. Relational database model was first proposed by
(a) EE Codd (b) EF Codd
(c) EF Cadd (d) EF Codder

12. The clause used to sort data in database
(a) SORT BY (b) GROUP BY
(c) ORDER BY (d) SELECT

13. Importing C++ program in a Python program is called
(a) Wrapping (b) Downloading
(c) Interconnecting (d) Parsing

14. The most commonly used statement in SQL is
(a) cursor (b) commit
(c) execute (d) select

15. Identify the package manager for Python packages, or modules
(a) Matplot_lib (b) PIP
(c) plt.show( ) (d) Python package

PART - II

Answer any six questions. in which question number 24 is compulsory. **6 × 2 = 12**

16. What are subroutine?

17. What is searching? Write its types.

18. Write short notes on tokens.

19. Write a Python program to print.

```
1
1  2
1  2  3
1  2  3  4
1  2  3  4  5
```

20. What are the main advantages of function?

21. What will be the output of the following Python Code?

```
str="Chennai"
print(str*4)
```

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

23. Differentiate Python and C++.

24. Define Data Visualization.

PART - III

Answer any six questions in which Question number 33 is compulsory. **6 × 3 = 18**

25. Why access control is required?

26. List the difference between break and continue statements.

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

28. What are the difference between List and Dictonary?

29. Write a Python program to check and print if the given number is odd or even using class.

30. What is constraint? Write short notes on primary key constraint.

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

32. What is SQLite? What is its advantage?

33. Write any three uses of data visualization.

PART - IV

Answer all the questions:. **5 × 5 = 25**

34. (a) Write any five characteristics of Module.

(OR)

(b) Write any five characteristics of Algorithm.

35. (a) Explain the various operators in Python.

(OR)

(b) Write a detail note on if..... else..... elif statement with suitable example.

36. (a) Explain the scope of variable with example in Python.

(OR)

(b) Explain about string operators in Python with suitable example.

37. (a) What is the purpose of range( ) in Python list? Explain with an example.

(OR)

(b) Explain the different types of data model.

38. (a) Consider the following student table. Write SQL command for the questions (i) to (v).

Roll No.	Name	Group
1001	Ganesh	A1
1002	Kumar	A2
1003	Mani	B1
1004	Raju	A1
1005	Thulasi	A2
1006	Geetha	B1
1007	Latha	A1
1008	Banu	A2
1009	Kavya	B1

(i) To display the details of all students in ascending order of name.

(ii) To display all students in A2 group.

(iii) To display the details group wise.

(iv) To add new row

(v) To remove students who are in B1 group.

(OR)

(b) Mylist = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]

Write the Python commands for the following based on above list.

(i) To print all elements in list.

(ii) Find list length

(iii) Add multiple elements [110, 120, 130]

(iv) Delete from fourth element to seventh element.

(v) Delete entire list.

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12th STD

PUBLIC EXAM QUESTION PAPER MARCH - 2020

COMPUTER SCIENCE (with Answers)

Reg. No.

TIME ALLOWED : 3.00 Hours] **PART - III** **[MAXIMUM MARKS : 70**

Instructions :

1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor Immediately.
2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams

PART - I

Note : Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

[15 × 1 = 15]

1. The functions which will give exact result when same arguments are passed are called :
(a) Pure functions
(b) Impure functions
(c) Partial functions
(d) Dynamic functions

2. A sequence of immutable objects is called :
(a) Derived data (b) Built in
(c) List (d) Tuple

3. Which of the following members of a class can be handled only from within the class?
(a) Public members
(b) Private members
(c) Protected members
(d) Secured members

4. Two main measures for the efficiency of an algorithm are :
(a) Data and space
(b) Processor and memory
(c) Complexity and capacity
(d) Time and space

5. Expand IDLE :
(a) Integrated Design Learning Environment
(b) Insert Development Learning Environment
(c) Integrated Develop Learning Environment
(d) Integrated Development Learning Environment

6. Whats is the output of the following snippet?
for i in range (2,10,2) :
print (i, end='')
(a) 8 6 4 2 (b) 2 4 6 8 10
(c) 2 4 6 8 (d) 2 4 6

7. Evaluate the following function and write the output.
x=14.4
print(math.floor(x))
(a) 13 (b) 14
(c) 15 (d) 14.3

8. What will be the output of the following code?
str="NEW DELHI"
str[3]="-"
(a) NEW-DELHI (b) NE-DELHI
(c) NEW DELHI (d) NEW-ELHI

9. The keys in Python, dictionary is specified by :
(a) ; (b) = (c) : (d) +

10. Class members are accessed through which operator?
(a) . (b) & (c) % (d) #

11. What symbol is used for SELECT statement?
(a) Ω (b) σ (c) π (d) X

12. The command to delete a table is :
(a) DROP (b) ALTER TABLE
(c) DELETE (d) DELETE ALL

13. A CSV file is also known as a :
(a) Random File (b) String File
(c) 3D File (d) Flat File

14. A framework for interfacing Python and C++ is :
(a) Ctypes (b) Boost
(c) SWIG (d) Cython

15. Which of the following is an organized collection of data?
(a) Records (b) Information
(c) DBMS (d) Database

PART - II

Note : Answer any six questions. Question No. 24 is compulsory. $6 \times 2 = 12$

16. What is a Pair? Give an example.
17. What do you mean by Namespaces?
18. What is an Algorithm?
19. Write note on range () in loop.
20. Write categories of SQL commands.
21. Write the expansion of : (i) SWIG (ii) MinGW
22. What is the advantage of declaring a column as "INTEGER PRIMARY KEY"?
23. List the general types of data visualization.
24. What will be the output of the given Python program?

```
str="COMPUTER SCIENCE"
```

(a) print(str*2) (b) print(str[0:7])

PART - III

Note : Answer any six questions. Question No. 33 is compulsory. $6 \times 3 = 18$

25. Differentiate pure and impure function.
26. Write a note on Asymptotic notation.
27. Explain Ternary operator with example.
28. How recursive function works?
29. What will be the output of the following code?

```
list=[3**x for x in range(5)]
print(list)
```

30. Write short notes on TCL commands in SQL.
31. What is the difference between reader() and DictReader() function?
32. Mention the difference between fetchone() and fetchmany().
33. Write the output of the following program.

```
class Hosting:
    def __init__(self, name):
        self.__name = name
    def display(self):
        print("Welcome to", self.__name)
obj=Hosting("Python Programming")
obj.display()
```

PART - IV

Note : Answer all the questions:. $5 \times 5 = 25$

34. (a) Discuss about Linear Search algorithm with example.

(OR)

(b) Explain input () and print () functions with example.

35. (a)(i) Write a program to display all 3 digit even numbers.

(ii) Write the output for the following program.

```
i=1
while(i<=6):
    for j in range (1,i):
        print(j,end='\t')
    print(end='\n')
    i+=1
```

(OR)

(b) Explain the following built-in functions.

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

36. (a) Write the output for the following Python commands :

```
str1="Welcome to Python"
```

(i) print(str1)
(ii) print(str1[11 : 17])
(iii) print(str1[11 : 17 : 2])
(iv) print(str1[: : 4])
(v) print(str1[: : –4])

(OR)

(b) How do define constructor and destructor in Python? Explain with example.

37. (a) Explain the different set operations supported by Python with suitable example.

(OR)

(b) Differentiate DBMS and RDBMS.

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

(OR)

(b) Write the features of Python over C++.

❁❁❁❁❁

ANSWER

PART - I

1. (a) Pure functions
2. (d) Tuple
3. (b) Private members
4. (d) Time and space
5. (d) Integrated Development Learning Environment
6. (c) 2 4 6 8
7. (b) 14
8. (a) NEW - DELHI
9. (c) :
10. (a) .
11. (b) σ
12. (a) DROP
13. (d) Flat File
14. (b) Boost
15. (d) Database

PART - II

16. **(i)** 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.

    (ii) **Example :** List = [(10,10), (1,20)]

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

    Example : a : = 5

    Here the variable 'a' is mapped to the value '5'.

18. 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.

19. range() generates a list of values starting from **start** till **stop-1**.

    range (start,stop,[step])

    Where,

    start – refers to the initial value

    stop – refers to the final value

    step – refers to increment value, this is optional part.

20. **(i)** DDL - Data Definition Language

    (ii) DML - Data Manipulation Language

    (iii) DCL - Data Control Language

    (iv) TCL - Transaction Control Language

    (v) DQL - Data Query Language

21. **(i)** SWIG – Simplified Wrapper Interface Generator – Both C and C++.

    (ii) MINGW – Minimalist GNU for Windows

22. If a column of a table is declared to be an INTEGER PRIMARY KEY, then whenever a NULL is used as an input for this column, the NULL will be automatically converted into an integer which will be one larger than the highest value so far used in that column.
    If the table is empty, the value 1 will be used.

23. **(i)** Charts

    (ii) Tables

    (iii) Graphs

    (iv) Maps

    (v) Infographics

    (vi) Dashboards

24. **(a)** **Output :** COMPUTER SCIENCE COMPUTER SCIENCE

    (b) **Output :** COMPUTE

PART - III

25.

S. No.	Pure	Impure
(i)	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.
(ii)	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.
(iii)	They do not have any side effects.	They have side effects. For example, random(), Date().
(iv)	They do not modify the arguments which are passed to them	They may modify the arguments which are passed to them

26. Asymptotic Notations are languages that uses meaningful statements about time and space complexity. The following three asymptotic notations are mostly used to represent time complexity of algorithms:

    (i) **Big O :** Big O is often used to describe the worst-case of an algorithm.

(ii) **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).

(iii) **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.

27. (i) Ternary operator is also known as conditional operator that evaluate something based on a condition being true or false.

(ii) It simply allows testing a condition in a single line replacing the multiline if-else making the code compact.

Syntax :

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

(iii) **Example:**

min = 50 if 49 < 50 else 70 // min = 50

min = 50 if 49 > 50 else 70 // min = 70

28. (i) Recursive function is called by some external code.

(ii) If the base condition is met then the program gives meaningful output and exits.

(iii) Otherwise, function does some required processing and then calls itself to continue recursion.

29. Output : [1,3,9,2,7,81]

30. (i) **Commit :** Saves any transaction into the database permanently.

(ii) **Roll back :**Restores the database to last commit state.

(iii) **Save point :** Temporarily save a transaction so that you can rollback.

31. Reader():

(i) The reader function is designed to take each line of the file and make a list of all columns.

(ii) Using this method one can read data from csv files of different formats like quotes (" "), pipe (|) and comma (,).

(iii) csv. Reader work with list/tuple.

(iv) **Syntax:** csv.reader(fileobject,delimiter, fmtparams)

DictReaer() :

(i) DictReader works by reading the first line of the CSV and using each comma separated value in this line as a dictionary key.

(ii) DictReader is a class of csv module is used to read a CSV file into a dictionary.

(iii) It creates an object which maps data to a dictionary.

(iv) csv.DictReader work with dictionary.

32.

	fetchone()	fetchmany()
(i)	The fetchone() method returns the next row of a query result set or None in case there is no row left	The fetchmany() method returns the next number of rows (n) of the result set.
(ii)	Using while loop and fetchone() method we can display all the records from a table.	Displaying specified number of records is done by using fetchmany().

33. Output : Welcome to Python Programming.

PART - IV

34. (a) (i) Linear search also called sequential search is a sequential method for finding a particular value in a list.

(ii) 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 :

(i) Traverse the array using for loop

(ii) 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.

(iii) If no match is found, display the search element not found.

Example

To search the number 25 in the array given below, linear search will go step by step in a sequential order starting from the first

element in the given array if the search element is found that index is returned otherwise the search is continued till the last index of the array. In this example number 25 is found at index number 3.

index	0	1	2	3	4
values	10	12	20	25	30

Example 1 :

Input: values[] = {5, 34, 65, 12, 77, 35}
target = 77
Output: 4

Example 2:

Input: values[] = {101, 392, 1, 54, 32, 22, 90, 93}
target = 200
Output: -1 (not found)

(OR)

(b) **Input and Output Functions :** 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 and the output function print() is used to display the result of the program on the screen after execution.

The input() function :

(i) In Python, input( ) function is used to accept data as input at run time. The syntax for input() function is,

Variable = input ("prompt string")

(ii) Where, prompt string in the syntax is a statement or message to the user, to know what input can be given.

(iii) 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.

(iv) If prompt string is not given in input( ) no message is displayed on the screen, thus, the user will not know what is to be typed as input.

(v) **Example 1 :** input( ) with prompt string

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

(vi) **Example 2 :** input( ) without prompt string

```
>>> city=input()
     Madurai
>>> print (I am from", city)
     I am from Madurai
```

(vii) Note that in example-2, the input( ) is not having any prompt string, thus the user will not know what is to be typed as input. If the user inputs irrelevant data as given in the above example, then the output will be unexpected. So, to make your program more interactive, provide prompt string with input( ).

(viii) 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.

(ix) **Example 3 :**

```
x = int (input("Enter Number 1: "))
y = int (input("Enter Number 2: "))
print ("The sum = ", x+y)
```

Output :

```
Enter Number 1: 34
Enter Number 2: 56
The sum = 90
```

The print() function :

(i) In Python, the print() function is used to display result on the screen. The syntax for print() is as follows :

(ii) **Example :**

```
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" ……)
```

(iii) **Example :**

```
>>> print ("Welcome to Python Programming")
    Welcome to Python Programming
>>> x = 5
>>> y = 6
>>> z = x + y
>>> print (z)
    11
>>> print ("The sum = ", z)
    The sum = 11
>>> print ("The sum of ", x, " and ", y, " is ", z)
    The sum of 5 and 6 is 11
```

(iv) The **print** ( ) evaluates the expression before printing it on the monitor.

(v) 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.

35. (a)(i)
```
for i range (100, 999, 2);
    print (i, end = '\t')
else;
    print ("\n End of the loop")
```
Output : 100, 102, 104, ... 998

(ii)
```
1
1  2
1  2  3
1  2  3  4
1  2  3  4  5
```

(OR)

(b)

S. No	Function	Description	Syntax	Example
1.	id ()	id( ) Return the "identity" of an object. i.e. the address of the object in memory. **Note:** The address of x and y may differ in your system.	id (object)	x=15 y='a' print ('address of x is :',id (x)) print ('address of y is :',id (y)) **Output:** address of x is : 1357486752 address of y is : 13480736
2.	chr ( )	Returns the Unicode character for the given ASCII value. This function is inverse of ord() function.	chr (i)	c=65 d=43 print (chr (c)) prin t(chr (d)) **Output:** A +
3.	round ( )	Returns the nearest integer to its input. **1.** First argument (number) is used to specify the value to be rounded.	round (number [,ndigits])	x= 17.9 y= 22.2 z= -18.3 print ('x value is rounded to', round (x)) print ('y value is rounded to', round (y)) print ('z value is rounded to', round (z))
4.	type ( )	Returns the type of object for the given single object. **Note:** This function used with single object parameter.	type (object)	x= 15.2 y= 'a' s= True print (type (x)) print (type (y)) print (type (s)) **Output:** <class 'float'> <class 'str'> <class 'bool'>
5.	pow ( )	Returns the computation of ab i.e. (a**b) a raised to the power of b.	pow (a,b)	a= 5 b= 2 c= 3.0 print (pow (a,b)) print (pow (a,c)) print (pow (a+b,3)) **Output:** 25 125.0 343

36. (a) (i) Welcome to Python
(ii) Python
(iii) Pto
(iv) wotyn
(v) nytow

(OR)

(b) **Constructor :**

(i) Constructor is the special function that is automatically executed when an object of a class is created. In Python, there is a special function called "init" which act as a Constructor.

(ii) It must begin and end with double underscore.

(iii) Constructor function will automatically executed when an object of a class is created.

General format of constructor :
```
def__init__(self, [args .....]):
    <statements>
```
Example : Program to illustrate Constructor
```
class Sample:
    def __init__(self, num):
        print("Constructor of class Sample...")
        self.num=num
        print("The value is :", num)
S=Sample(10)
```
Destructor :

(i) Destructor is also a special method gets executed automatically when an object exit from the scope.

(ii) In Python, __del__() method is used as destructor.

General format of constructor :

```
def__del__(self):
<statements>
```

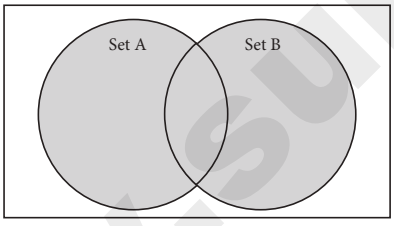
Example : Program to illustrate about the __del__( ) method

```
class Sample:
    num=0
    def __init__(self, var):
        Sample.num+=1
        self.var=var
        print("The object value is = ", var)
        print("The value of class variable is= ", Sample.num)
    def __del__(self):
        Sample.num-=1
        print("Object with value %d is exit from the scope"%self.var)
S1=Sample(15)
S2=Sample(35)
S3=Sample(45)
```

37. (a) A set is a mutable and an unordered collection of elements without duplicates.

Set operations: The set operation such as Union, Intersection, difference and symmetric difference.

Union: It includes all elements from two or more sets



(i) In python, the operator | is used to union of two sets. The function union( ) is also used to join two sets in python.

(ii) **Example :** Program to Join (Union) two sets using union operator

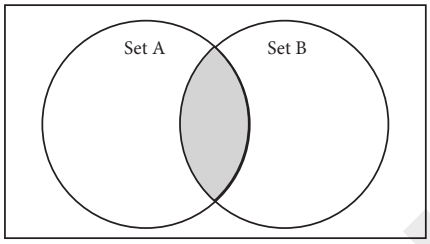
```
set_A={2,4,6,8}
set_B={'A', 'B', 'C', 'D'}
U_set=set_A|set_B
print(U_set)
```

Output :

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

Intersection :

(i) It includes the common elements in two sets



(ii) The operator & is used to intersect two sets in python. The function intersection( ) is also used to intersect two sets in python.

(iii) **Example :** Program to insect two sets using intersection operator

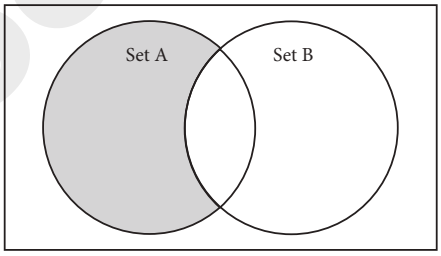
```
set_A={'A', 2, 4, 'D'}
set_B={'A', 'B', 'C', 'D'}
print(set_A & set_B)
```

Output :

{'A', 'D'}

Difference :

(i) It includes all elements that are in first set (say set A) but not in the second set (say set B)



(ii) The minus (–) operator is used to difference set operation in python. The function difference( ) is also used to difference operation.

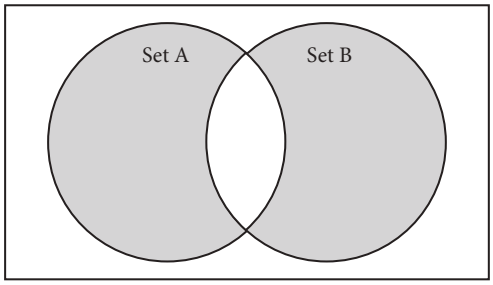
(iii) **Example :** Program to difference of two sets using minus operator

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

Output : {2, 4}

Symmetric difference :

(i) 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.



(ii) The caret (^) operator is used to symmetric difference set operation in python. The function **symmetric_difference( )** is also used to do the same operation.

(iii) **Example :** Program to symmetric difference of two sets using caret operator

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

Output :

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

(OR)

(b)

Basis of Comparison	DBMS	RDBMS
Expansion	Database Management System	Relational DataBase Management System
Data storage	Navigational model ie data by linked records	Relational model (in tables). ie data in tables as row and column
Data redundancy	Exhibit	Not Present
Normalization	Not performed	RDBMS uses normalization to reduce redundancy
Data access	Consumes more time	Faster, compared to DBMS.
Keys and indexes	Does not use.	used to establish relationship. Keys are used in RDBMS.
Transaction management	Inefficient, Error prone and insecure.	Efficient and secure.
Distributed Databases	Not supported	Supported by RDBMS.
Example	Dbase, FoxPro.	SQL server, Oracle, mysql, MariaDB, SQLite.

38. (a)

```
CREATE TABLE employee
(
empcode integer NOTNULL,
name char(20),
desigchar(20),
Pay integer,
allowance integer,
PRIMARY KEY (empno)
);
```

(OR)

(b) **(i)** Python uses Automatic Garbage Collection whereas C++ does not.

(ii) C++ is a statically typed language, while Python is a dynamically typed language.

(iii) Python runs through an interpreter, while C++ is pre-compiled.

(iv) Python code tends to be 5 to 10 times shorter than that written in C++.

(v) In Python, there is no need to declare types explicitly where as it should be done in C++

(vi) In Python, a function may accept an argument of any type, and return multiple values without any kind of declaration beforehand. Whereas in C++ return statement can return only one value.

☆☆☆

[Notes]