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3.SCOPING

Section – A

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

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

(A) Scope **(B) Mapping** (C) late binding (D) early binding

3. Which of the following is used in programming languages to map the variable and object?

(A) :: (B) := **(C) =** (D) ==

4. Containers for mapping names of variables to objects is called

(A) Scope (B) Mapping (C) Binding **(D) Namespaces**

5. Which scope refers to variables defined in current function?

(A) Local Scope (B) Global scope (C) Module scope (D) Function Scope

6. The process of subdividing a computer program into separate sub-programs is called

(A) Procedural Programming **(B) Modular programming**

(C)Event Driven Programming (D) Object oriented Programming

7. Which of the following security technique that regulates who can use resources in a computing environment?

(A) Password (B)Authentication **(C) Access control** (D) Certification

8. Which of the following members of a class can be handled only from within the class?

(A) Public members (B)Protected members (C) Secured members **(D) Private members**

9. Which members are accessible from outside the class?

(A) Public members (B)Protected members (C) Secured members (D) Private members

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

(A) Public members **(B)Protected members** (C) Secured members (D) Private members

Section-B

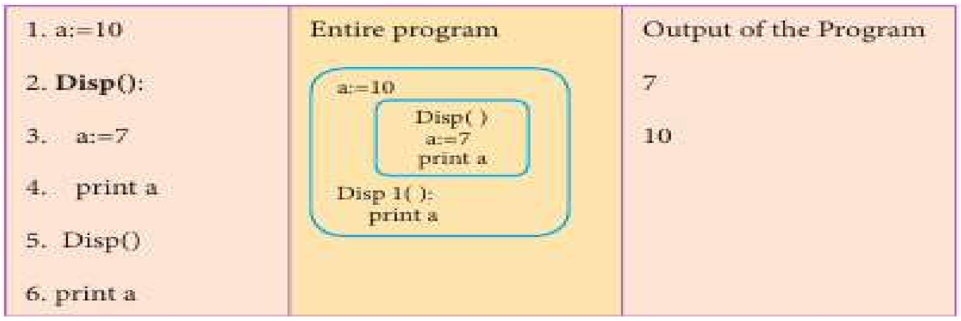
Answer the following questions **(2 Marks)**

1. What is a scope?

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

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

- The scope should be used for variables because; it limits a variable's scope to a single definition.
- That is the variables are visible only to that part of the code.
- **Example:**



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

3. What is Mapping?

- 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?

- Namespaces are containers for mapping names of variables to objects (name : = object).
- **Example:** **a:=5**
- Here the variable 'a' is mapped to the value '5'.

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

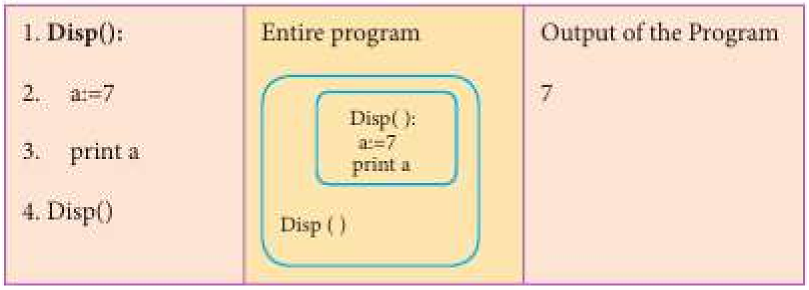
- Python prescribes a convention of adding a prefix **__(double underscore)** results in a variable name or method becoming **private**.
- **Example:** **self.__n2=n2**
- Adding a prefix **_ (single underscore)** to a variable name or method makes it protected.
- **Example:** **self._sal = sal**

Section-C

Answer the following questions **(3 Marks)**

1. Define Local scope with an example.

- Local scope refers to variables defined in current function.
- A function will always look up for a variable name in its local scope.
- Only if it does not find it there, the outer scopes are checked.
- **Example:**



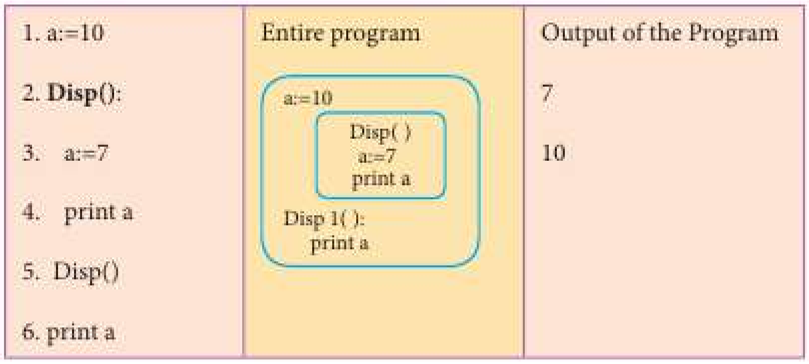
1. **Disp():**	Entire program	Output of the Program
2. a:=7		7
3. print a		
4. Disp()		

Disp( ):
a:=7
print a
Disp ( )

- 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.

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



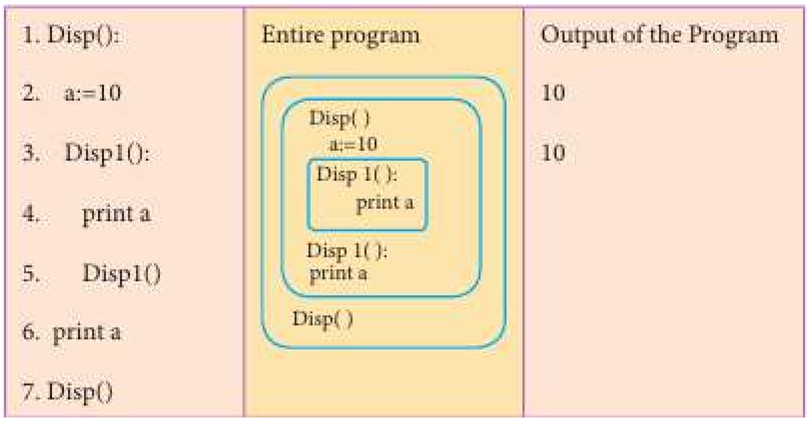
1. a:=10	Entire program	Output of the Program
2. **Disp():**		7
3. a:=7		10
4. print a		
5. Disp()		
6. print a		

a:=10
Disp( )
a:=7
print a
Disp 1( ):
print a

- 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.

- 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.
- When a compiler or interpreter searches for a variable in a program, it first search Local, and then search Enclosing scopes.



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

Entire program
Disp( )
a:=10
Disp 1( ):
print a
Disp 1( ):
print a
Disp( )

Output of the Program

10

10

- In the above example Disp1() is defined within Disp(). The variable ‘a’ defined in Disp() can be even used by Disp1() because it is also a member of Disp().

4. Why access control is required?

- Access control is a security technique that regulates who or what can view or use resources in a computing environment.
- It is a fundamental concept in security that minimizes risk to the object.
- In other words access control is a selective restriction of access to data.
- 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
myfavcolor():
g:=Green
print color, b, g
myfavcolor()
print color, b
mycolor()
print color
```

<u>OUTPUT:</u>

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

<u>Scope of Variables:</u>

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

Section - D

Answer the following questions: **(5 Marks)**

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

SCOPE:

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

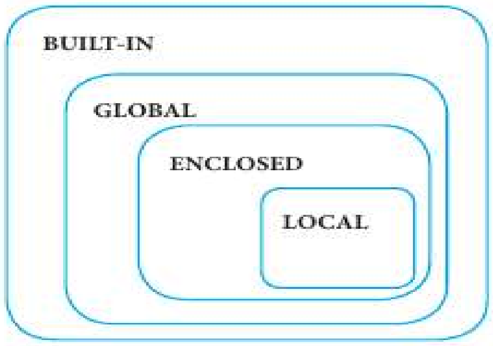
TYPES OF VARIABLE SCOPE:

- ➢ Local Scope
- ➢ Enclosed Scope
- ➢ Global Scope
- ➢ Built-in Scope

LEGB RULE:

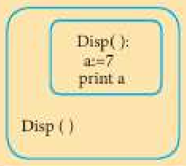
- The **LEGB** rule is used to decide the order in which the scopes are to be searched for scope resolution.
- The scopes are listed below in terms of hierarchy (highest to lowest).

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)



i) LOCAL SCOPE:

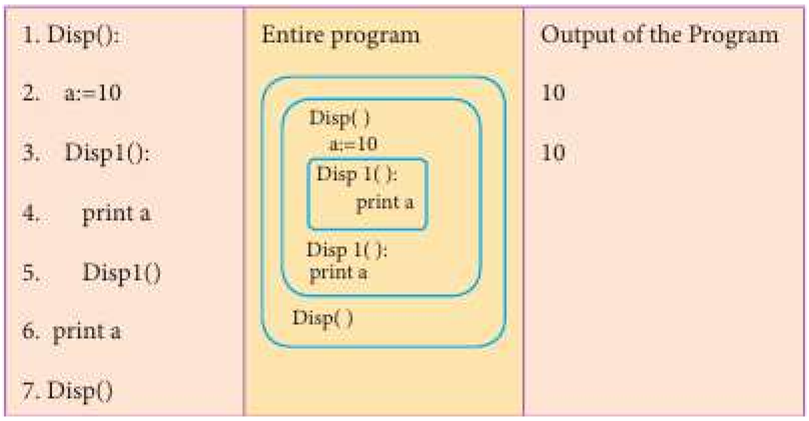
- Local scope refers to variables defined in current function.
- A function will always look up for a variable name in its local scope.
- Only if it does not find it there, the outer scopes are checked.
- **Example:**

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

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

ii) ENCLOSED SCOPE:

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



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

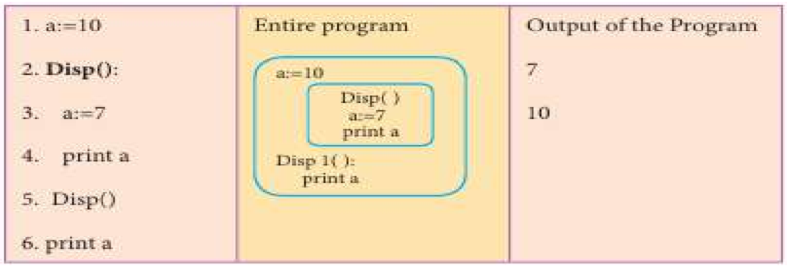
Output of the Program

```
10
10
```

- In the above example Disp1() is defined within Disp(). The variable ‘a’ defined in Disp() can be even used by Disp1() because it is also a member of Disp().

iii) GLOBAL SCOPE:

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



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

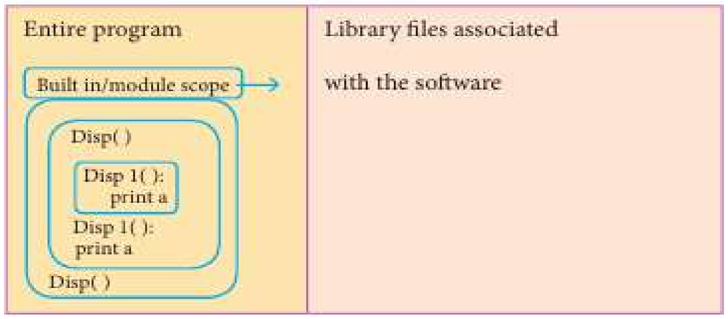
Output of the Program

```
7
10
```

- 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.

iv) BUILT-IN-SCOPE:

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



2. Write any Five Characteristics of Modules.

The following are the desirable characteristics of a module.

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

3. Write any five benefits in using modular programming.

- Less code to be written.
- A single procedure can be developed for reuse, eliminating the need to retype the code many times.
- Programs can be designed easily because a small team deals with only a small part of the entire code.
- Modular programming allows many programmers to collaborate on the same application.
- The code is stored across multiple files.
- Code is short, simple and easy to understand.
- Errors can easily be identified, as they are localized to a subroutine or function.
- The same code can be used in many applications.
- The scoping of variables can easily be controlled.

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