CHAPTER

2

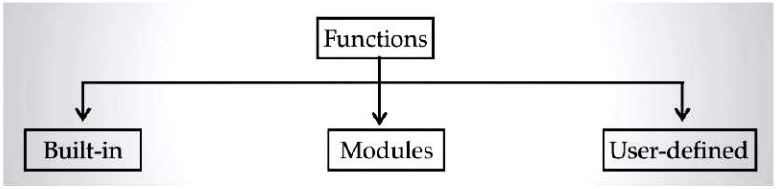
FUNCTIONS

Syllabus

- ***Functions: Types of function (built-in functions, functions defined in module, user defined functions), Creating user defined function, arguments and parameters, default parameters, positional parameters, function returning value(s), flow of execution, scope of a variable (global scope, local scope)***

Revision Notes

- A function is a named block of statements that can be invoked by its name. A function is organized and reusable code that is used to perform a single, given action. Functions provide better modularity for your application and a high degree of code reusability.
- The math module of Python provides mathematical functionality. Function blocks begin with the keyword def followed by the function name and parentheses e.g def sum( ): Any input parameters or arguments should be placed within these parentheses. You can also define parameters inside these parentheses. The first statement of a function can be an optional statement - the documentation string of the function or docstring, The code block within every function starts with a colon (:) and is indented. The statement return [expression] exit a function, optionally passing back an expression to the caller. A return statement with no arguments is the same as return None. Defining a function only gives a name, specifies the parameters that are to be included in the function, a structure the blocks of code.



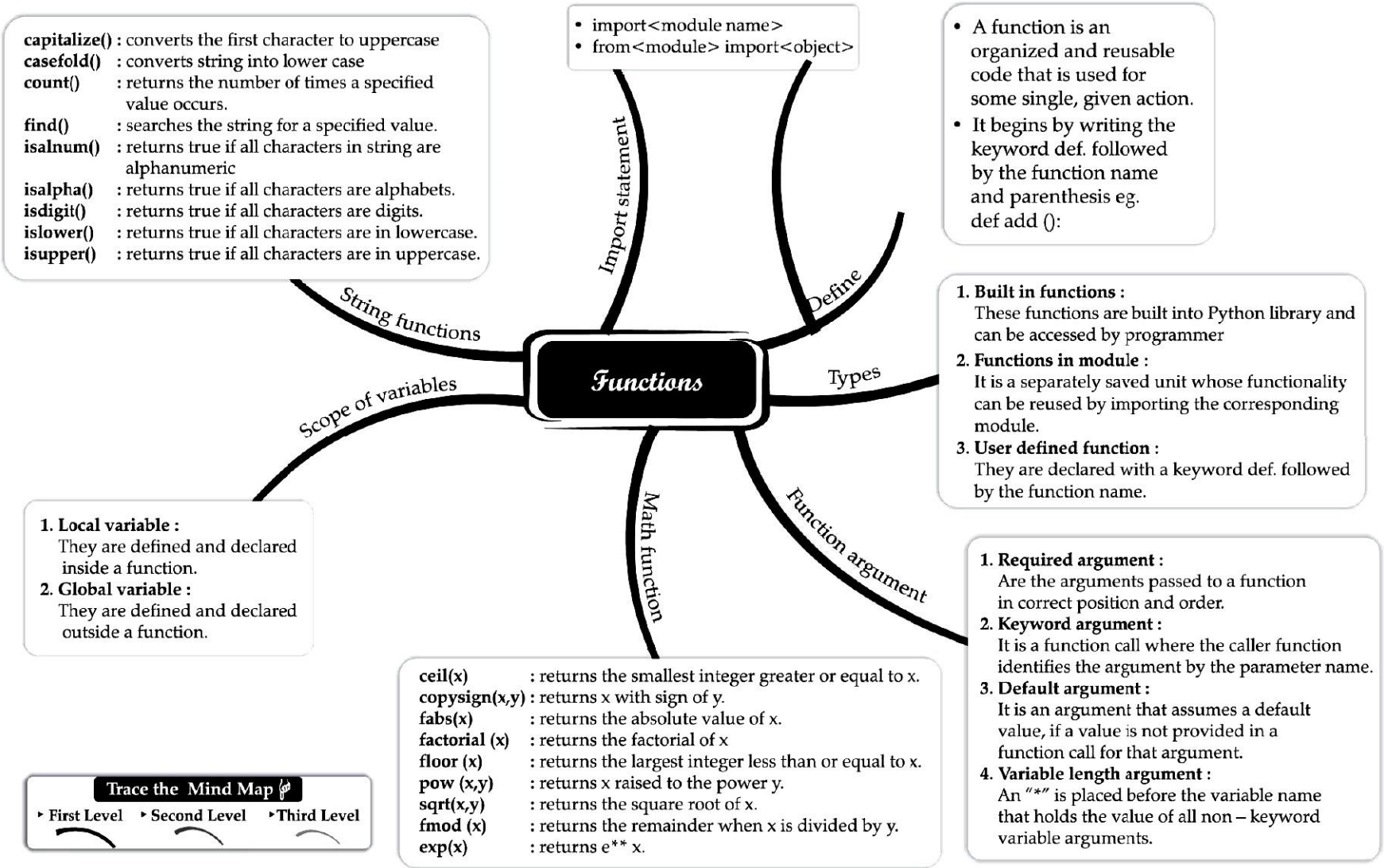
- **Examples of Some Built-in Functions**

  (i) print() : It prints objects to the text stream file.

  (ii) input() : It reads the input, converts it to a string and returns that.

  (iii) sorted() : Returns a new sorted list from the items in iterable.

  (iv) bool() : Returns a boolean value i.e., True or False.


Functions
String functions
capitalize() : converts the first character to uppercase
casefold() : converts string into lower case
count() : returns the number of times a specified value occurs.
find() : searches the string for a specified value.
isalnum() : returns true if all characters in string are alphanumeric
isalpha() : returns true if all characters are alphabets.
isdigit() : returns true if all characters are digits.
islower() : returns true if all characters are in lowercase.
isupper() : returns true if all characters are in uppercase.
Import statement
import<module name>
from<module> import<object>
Define
A function is an organized and reusable code that is used for some single, given action.
It begins by writing the keyword def. followed by the function name and parenthesis eg. def add ():
Types
1. Built in functions : These functions are built into Python library and can be accessed by programmer
2. Functions in module : It is a separately saved unit whose functionality can be reused by importing the corresponding module.
3. User defined function : They are declared with a keyword def. followed by the function name.
Scope of variables
1. Local variable : They are defined and declared inside a function.
2. Global variable : They are defined and declared outside a function.
Math function
ceil(x) : returns the smallest integer greater or equal to x.
copysign(x,y) : returns x with sign of y.
fabs(x) : returns the absolute value of x.
factorial (x) : returns the factorial of x
floor (x) : returns the largest integer less than or equal to x.
pow (x,y) : returns x raised to the power y.
sqrt(x,y) : returns the square root of x.
fmod (x) : returns the remainder when x is divided by y.
exp(x) : returns e** x.
Function argument
1. Required argument : Are the arguments passed to a function in correct position and order.
2. Keyword argument : It is a function call where the caller function identifies the argument by the parameter name.
3. Default argument : It is an argument that assumes a default value, if a value is not provided in a function call for that argument.
4. Variable length argument : An "*" is placed before the variable name that holds the value of all non – keyword variable arguments.
Trace the Mind Map
First Level
Second Level
Third Level

(v) min() : Returns the smallest of two or more arguments.

(vi) any() : Returns True if any element of the iterable is True.

- The built-in functions of Python are always available, one needs not import any module for them. The math module of Python provides mathematical functionality.
  - exp(x): Return e**x
  - log(x,(base)): With one argument, returns the natural logarithm of x (to base e).
  - With two arguments, returns logarithm of x to the given base calculate as log(x)/ log(base)
  - log10(x): Returns logarithm of x at base 10. This is usually more accurate than log(x,10).
  - pow(x, y): Returns x raised to the power y. In particular, pow(1.0, x) and pow(x, 0.0) always return 1.0, even when x is a zero or a NaN. If both x and y are finite, x is negative, and y is not an integer then pow(x, y) is undefined, and raises ValueError.
  - sqrt(x): Returns the square root of x.
  - cos(x): Returns the cosine of x radians.
  - sin(x): Returns the sine of x radians.
  - tan(x): Returns the tangent of x radians.
  - degrees(x): Converts angle x from radians to degrees.
  - radians(x): Converts angle x from degrees to radians.
  - String Functions
    (i) partition(): It splits the string at the first occurrence of the given argument and returns a tuple containing three parts.
    (ii) join(): It takes a list of string and joins them as a regular string.
    (iii) split(): It splits the whole string into the items with separator as a delimeter.
  - User-Defined Functions: User defined functions are those that we define ourselves in our program and then call them wherever we need.
- sys.stdin is the most widely used method to read input from the command line or terminal. The command line sys. argv argument is another way that we can grab input, and environment variables can also be used from within our programs.
- The scope of a variable determines the portion of the program where you can access a particular identifier. There are two basic scopes of variables in Python :
  1. Global variables
  2. Local variables

  Variables that are defined inside a function body have a local scope, and those defined outside have a global scope. All variables in a program may not be accessible at all locations in that program. This depends on where you have declared a variable or the scope of variable
- **Passing different objects as arguments**

  You can send any data types of argument to a function as string, number, list, dictionary etc., and it will be treated as the same data type inside a function.

  e.g. List as an argument

```
def fun(Fruit):
    for i in Fruit:
        print(i)
Food = ["Mango", "Cherry", "Grapes", "Banana"]
fun(Food)
```

  Output

```
Mango
Cherry
Grapes
Banana
```

- In Python, a number of mathematical operations can be performed with ease by importing a module named "math" which defines various functions which makes our task easier.
  - ceil(x): Returns the ceiling of x as a float, the smallest integer value greater than or equal to x.

- floor(x) : Returns floor of x as a float, the largest integer value less than or equal to x.
- fabs(x): Returns the floating point absolute value of x.

➢ **Flow of Execution:** Flow of execution can be defined as the order in which the statements in a program are executed. The Python interpreter starts executing the instructions in a program from the first statement. The statements are executed one by one, in the order of appearance from top to bottom.

➢ If a def statement is encountered all the statements of the function are skipped but the function head is interpreted to check if it is valid.

➢ If a function call is encountered the statements in the called function are executed from top to bottom.

Know the Terms

➢ **Global Variables** are the one that are defined and declared outside a function and we need to use them inside a function.

➢ **Local Variables:** A variable declared inside the function's body and in the local scope is known as a local variable.

➢ **Doc Strings** are triple quoted string in Python module program which are displayed as document when help command is used.

➢ **Modularity:** The act of partitioning a program into individual components (modules) is called modularity.

➢ **Parameters** are variables listed within parentheses of a function header.

STAND ALONE MCQs (1 Mark each)

Q. 1. What will be the output of the following code?
print (type(type(int)))
(A) type 'int' **(B)** <class 'type'>
(C) Error **(D)** <class 'int'>

Ans. Option (B) is correct.

> *Explanation:* type () method returns class type of the argument (object) passed as parameter. This function is mostly used for debugging purpose.

Q. 2. What will be the output of the following code?
L = ['a','b','c','d'] print (" ".join(L))
(A) Error **(B)** a b c d
(C) ['a','b','c','d'] **(D)** None

Ans. Option (B) is correct.

> *Explanation:* Join () method string method and returns a string in which the elements of sequence have been joined by str separator.
> **Syntax** string-name-join (iterable).

Q. 3. What is called when a function is defined inside a class?
(A) Module **(B)** Class
(C) Another function **(D)** Method

Ans. Option (D) is correct.

> *Explanation:* Method is called when a function is defined inside a class. A function is a named block of statements that can be invoked by its name

Q. 4. **Which of the following is the use of id() function in python?**
(A) id() returns the identity of the object
(B) Every object doesn't have a unique ID
(C) All of the mentioned
(D) None of the mentioned

Ans. Option (A) is correct.

> *Explanation:* Batch object in Pythan has a unique id. The id () function returns the objects id.

Q. 5. Suppose list1 is [3, 4, 5, 20, 5, 25, 1, 3], what is list1 after list1.pop(1)?
(A) [3, 4, 5, 20, 5, 25, 1, 3]
(B) [1, 3, 3, 4, 5, 5, 20, 25]
(C) [3, 5, 20, 5, 25, 1, 3]
(D) [1, 3, 4, 5, 20, 5, 25]

Ans. Option (C) is correct.

> *Explanation:* pop () method is used to remove the element from the list whose index is given. Here index 1 is given as argument in pop () so 4 has deleted from list.

Q. 6. What will be the output of the following python code?

```
def cube (x):
    return x * x * x
x = cube (2)
print (x)
```

(A) 2 **(B)** 4
(C) 8 **(D)** 20

Ans. Option (C) is correct.

> *Explanation:* A function is created to do a specific task. Often there is a result from such a task. The return keyword is used to return values from a function. A function may or may not return a value. If a function does not have a return keyword, it will send none value.

Q. 7. What are the two main types of functions?
(i) Custom function
(ii) Built in function
(iii) User define function
(iv) System function
(A) (i) and (ii) **(B)** (ii) and (iii)
(C) (iii) and (iv) **(D)** (i) and (iv)

Ans. Option (ii) is correct.

> ***Explanation:*** Built in functions and user defined functions are the two main types of functions. The Built in functions are part of the pythan language that are per defined e.g. dir (),len (), abs () etc.
>
> The user defined functions are functions created with the def keyword.

Q. 8. Which of the following refers to mathematical function?
(A) sqrt **(B)** Rhombus
(C) add **(D)** Rqrt Add

Ans. Option (A) is correct.

> ***Explanation:*** Functions that are always available for usage, functions that are contained within external modules, which must be imported and functions defined by a programmer with the def keyword.
>
> e.g. from math import sqrt
>
> A sqrt () function is imported from the math module.

ASSERTION AND REASON BASED MCQs (1 Mark each)

Directions : In the following questions, A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as.

(A) Both A and R are true and R is the correct explanation for A.
(B) Both A and R are true and R is not correct explanation for A.
(C) A is true but R is false.
(D) A is false but R is true.

Q. 1. Assertion (A): Built in function are predefined in the language that are used directly.
Reason (R): print () and input () are built in functions

Ans. Option (B) is correct.

> ***Explanation:*** The Python built in function are defined as the functions whose functionality is pre-defined. The Python interpreter has several functions that are always present for use.
>
> e.g. print (), input (), sorted (), main() etc.

Q. 2. Assertion (A): Key word arguments are related to the function calls.
Reason (R): When you use keyword arguments in a function call, the caller identifies the arguments by the parameter name.

Ans. Option (A) is correct.

> ***Explanation:*** Keyword argument is the type of function argument are related to the function calls. When we use keyword arguments in a function call, the caller identifies the argument by the parameter name.

Q. 3. Assertion (A): A function is a block of organized are reusable code that is used to perform a single, related action.
Reason (R): Function provide better modular by for your application and a high degree of code reusability.

Ans. Option (A) is correct.

> ***Explanation:*** A function is a block of organised and reusable code that is used to perform a single, related action, function provide better modularity for your application and a high degree of code reusability. Function begin with the keyword def followed by function name and parenthesis ().

CASE-BASED MCQs

Attempt any four sub parts from each question. Each sub part carries 1 mark.

I. Function Arguments
These are the values provided in function call/ invoke statement. Required arguments are the arguments passed to a function in correct positional order. Keyword arguments are related to the function calls. When you use keyword arguments in a function call, the caller identifies the arguments by the parameter name. A default argument is an argument that assumes a default value, if a value is not provided in the function call for that argument.

Q. 1. How many types of arguments are there in functions?
(A) 2 **(B)** 3
(C) 4 **(D)** 5

Ans. Option (C) is correct.

> ***Explanation:*** There are four arguments in functions as:
>
> • Required arguments/Positional arguments.

- Keyword arguments
- Default arguments
- Variable length arguments

Q. 2. Which argument is an argument that assumes a default value?
(A) Default argument
(B) Positional argument
(C) Keyword argument
(D) None of these

Ans. Option (A) is correct.

Explanation: A default arguments is an arguments that assumes a default value, if a value is not provided in the function call for that argument.

Q. 3. Which arguments are also known as positional arguments?
(A) Keyword argument
(B) Default argument
(C) Required argument
(D) Variable length argument

Ans. Option (C) is correct.

Explanation: Required arguments are also known positional argument. These arguments are the arguments passed to a function in correct positional order.

Q. 4. Which of these is/are formal argument (s)?
(A) Required argument
(B) Keyword argument
(C) Default argument
(D) All of these

Ans. Option (D) is correct.

Explanation: Formal arguments arc the values provided in function call/invoke statement. You can call a function by using the following types of formal arguments as
- Required arguments
- Key word arguments
- Default arguments
- Variable length arguments

Q. 5. _____ are the values provided in function call/invoke statement.
(A) Functions **(B)** Arguments
(C) Preprocessor **(D)** Models

Ans. Option (B) is correct.

Explanation: Argument are the values provided in function call/invoke statement. A function is a block of organised and reusable code that is used to perform a single, related action.

II. Functions

A function is a block of organised and reusable code that is used to perform a single, related action. Functions provide better modularity for your application and a high degree of code reusability. The function blocks begin with the keyword def followed by the function name and parentheses (). Any input parameters or argumeters should be placed within these parentheses. You can also define parameters inside these parentheses.

Q. 1. Which keyword is used to define function?
(A) def **(B)** fun
(C) definition **(D)** function

Ans. Option (A) is correct.

Explanation: A function is a block of organised and reusable code that is used to perform a single, related action. The function locks with the keyword def followed by the function name.

Q. 2. Which type of bracket is placed after name of function?
(A) [ ] **(B)** { }
(C) ( ) **(D)** < >

Ans. Option (C) is correct.

Explanation: The function blocks begin with the keyword def followed by the function name and parentheses (). Any input parameters or arguments should be placed within these parentheses.

Q. 3. A/An _____ is a block of organised and reusable code.
(A) Function **(B)** argument
(C) parameter **(D)** Definition

Ans. Option (A) is correct.

Explanation: A function is a block of organised and reusable code that is used to perform a single, related action. Functions provide better modularity for your application and a high degree of code reusability.

Q. 4. Parameters are defined inside
(A) angular brackets **(B)** square brackets
(C) Mid brackets **(D)** Parentheses

Ans. Option (D) is correct.

Explanation: Parameters are defined inside parentheses to function are references to object, which are passed value. When you pass a variable to a function, Python passes the reference to the object to which the variable refers.

Q. 5. Function is used to perform _____ related action.
(A) double **(B)** multiple
(C) single **(D)** All of these

Ans. Option (C) is correct.

Explanation: Function is used to perform related action. A function is a block by code which only runs when it is called. You can pass data, known as parameters into a function.

III. Here is the function to find the sum of arguments

```
total = _____      # Line 1
def sum (arg1, arg2) __ # Line 2
   total = arg1 + _____ # Line 3
   print (total)
   return _____    # Line 5
total = sum (10, 20)
print ( _____ )    # Line 7
```

Q. 1. Which value or constant will be equal to variable total in line 1?

(A) 1 **(B)** 0
(C) 2 **(D)** None

Ans. Option (B) is correct.

> ***Explanation:*** Here total is the variable whose value is fixed during the execution of the program

Q. 2. Which symbol is used to terminate the function def in line 2?

(A) ; **(B)** .
(C) : **(D)** ,

Ans. Option (C) is correct.

> ***Explanation:*** Python provides the def keyword to define the function the function def in line 2 is terminated with symbol :

Q. 3. Fill the blank in line 3

(A) sum **(B)** 1
(C) arg2 **(D)** 0

Ans. Option (C) is correct.

> ***Explanation:*** Total is defined the sum of arg 1 and arg 2.

Q. 4. Which value will be return in line 5?

(A) sum **(B)** total
(C) True **(D)** False

Ans. Option (B) is correct.

> ***Explanation:*** This is function will return the value of variable total.

Q. 5. Fill the blank in line 7.

(A) sum **(B)** True
(C) False **(D)** total

Ans. Option (D) is correct.

> ***Explanation:*** Line 7 will print the value of total which is the sum of arg 1 and arg 2.

❑❑