St. Paul's Mat. Hr. Sec. School, Block - 4, Neyveli, Cuddalore District
Common Quarterly Examination – 2023
Computer Science Answer Key

I. Choose the best Answer		
1	d) Parameters	1
2	a) Pair	1
3	d) Name Spaces	1
4	d) Half – interval search	1
5	d) Big O	1
6	d) Ctrl + N	1
7	a) Ternary	1
8	C) else if	1
9	a) for	1
10	b) x % 4 = = 0	1
11	b) return	1
12	b) [ ]	1
13	a) { }	1
14	b) . dot	1
15	d) {1, 3, 6, 9}	1
Part - II		
II. Answer the following (Any six) Q. No 24 is Compulsory		
16	<table><tr><th>Constructors</th><th>Selectors</th></tr><tr><td>Constructors are functions that build the abstract data type.</td><td>Selectors are functions that retrieve information from the data type.</td></tr></table>	2
17	**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.	2
18	**Algorithm** ➢ An algorithm is a finite set of instructions to accomplish a particular task. ➢ It is a step-by-step procedure for solving a given problem	2
19	**Tokens** ➢ Python breaks each logical line into a sequence of elementary lexical components known as **Tokens**. ➢ The normal token types are , 1) Identifiers, 2) Keywords, 3) Operators, 4) Delimiters and 5) Literals.	2
20	**Anonymous Function** ➢ 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.	2
21	**Main advantages of functions** ➢ It avoids repetition and makes high degree of code reusing. ➢ It provides better modularity for your application.	2
22	**Sets** ➢ In python a set is another type of collection data type ➢ A set is a mutable and an unordered collection of elements without or repeated element ➢ This feature used to include membership testing and eliminating duplicate element	2
23	**Create constructor in Python** ➢ **"init"** is a special function begin and end with double underscore in Python act as a Constructor. ➢ Constructor function will automatically executed when an object of a class is created. ➢ **General format:** def __init__(self, [args ……..]): <statements>	2
24	**Welcome Welcome Welcome Welcome**	2

III. Answer the following (Any six) Q.No 33 is Compulsory

25 — 3

Characteristics of Interface

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

26 — 3

Asymptotic Notation:

- Asymptotic Notationsare languages that use 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.

(iii) Big Θ

When an algorithm has a complexity with **lower bound = upper bound**,

27 — 3

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.

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( ): print a	Output of the Program 7 10

28 — 3

Arithmetic operator

- An arithmetic operator is a mathematical operator used for simple arithmetic
- It takes two operands and performs a calculation on them.

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
/ (Divisioin)	>>> a / b	10.0
% (Modulus)	>>> a % 30	10
** (Exponent)	>>> a ** 2	10000
// (Floor Division)	>>> a//30 (Integer Division)	3

29 — 3

range () function :

- range( ) generates a list of values starting from start till stop-1 in for loop.
- 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.

30 — 3

Ceil ( )	Floor ( )
Returns the smallest integer greater than or equal to x	Returns the largest integer less than or equal to x
math.ceil (x)	math.floor (x)

31 — 3

sort ( )

- sort the element in list
- syntax : list.sort (reverse = true | false, key = myfunc

Both arguments are optional

- If reverse is set as True, list sorting is in descending order.
- Ascending is default.
- Key=myFunc; "myFunc" - the name of the user defined function that specifies the sorting criteria.

Example :

```
MyList=['Thilothamma', 'Tharani', 'Anitha', 'SaiSree', 'Lavanya']
MyList.sort( )
print(MyList)

MyList.sort(reverse=True)
print(MyList)
```

Output:

['Anitha', 'Lavanya', 'SaiSree', 'Tharani', 'Thilothamma']
['Thilothamma', 'Tharani', 'SaiSree', 'Lavanya', 'Anitha']

32 — 3

while loop Syntax :

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

33 — 3

```
str1 = " COMPUTER"
index = len(str1)
for i in str1 :
    print( srt1 [ : index ])
    index – 1
```

IV. Answer all the questions — 5 marks

34 a) — 5

Parameter with type	Parameter without type
let rec pow (a:int) (b:int) : int := if b=0 then 1 else a * pow a (b-1) ➢ The parameters 'a' and 'b' are specified in the data type brackets () in the above function definition. ➢ This is an example of parameters with type.	let rec pow a b:= if b=0 then 1 else a * pow a (b-1) ➢ In the above function definition, the variables 'a' and 'b' are parameters and the value which is passed to the variables 'a' and 'b' are arguments. ➢ We have also not specified the data type for 'a' and 'b'. ➢ This is an example of parameters without type

34 b)

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.

35 a) **Bubble sort algorithm** 5

Bubble sort is a simple sorting algorithm, it starts at the beginning of the list of values stored in an array.

- It compares each pair of adjacent elements and swaps them if they are in the unsorted order.
- This comparison and passed to be continued until no swaps are needed, which shows the value sin an array is sorted.
- It is named so becase, the smaller elements "bubble" to the top of the list.
- It is too slow and less efficient when compared to other sorting methods.

Pseudo code

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

Example:

Consider an array with values {15, 11, 16, 12, 14, 13}
Below, we have a pictorial representation of how bubble sort.

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

35 b) **SCRIPT MODE PROGRAMMING:**

- A script is a text file containing the Python statements.
- Once the Python Scripts is created, they are reusable , it can be executed again and again withoutre typing.
- The Scripts are editable

(i)Creating Scripts in Python1.

- Choose **File→ New File** or press **Ctrl + N** in Python shell window.
- An **untitled** blank script text editor will be displayed on screen.

(ii)Saving Python Script

- Choose **File→ Save**or Press **Ctrl + S**
- Now, **Save As** dialog box appears on the screen.
- In the **Save As** dialog box
- Select the location to save your Python code.
- Type the file name in **File Name** box.
- Python files are by default saved with extension **.py.**
- So, while creating scripts using Python Script editor, no need to specify the file extension.
- Finally, click **Save** button to save your Python script.

(iii)Executing Python Script

- Choose **Run → Run Module** or Press **F5**
- If your 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 and execute it again.

36 a) **Nested if..elif...else statement:** 5

- When we need to construct a chain of **if** statement(s) then **elif** clause can be used instead of **else**
- **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.
- **Syntax:**

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

Example : Any one valid Example

36 b **Explain the following built in functions**

Function	Description	Syntax	Example
id ( )	Return the "identity" of an object. i.e. the address of the object in memory	type (object)	x=15 print ('address of x is :',id (x)) **Output:** address of x is : 1357486752
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)) O/P : A prin t(chr (d)) O/P : +
round ( )	Returns the nearest integer to its input. ➢ First argument (number) is used to specify the value to be rounded. ➢ Second argument (n digits) is used to specify the number of decimal digits desired after rounding	round (number[, ndigits])	x= 17.9 print ('x value is rounded to', round (x)) **Output:** X value is rounded to 18
type ( )	Returns the type of object for the given single object.	type(object)	x= 15.2 print (type (x)) **Output:** <class 'float'>
pow ( )	Returns the computation of a,b i.e. (a**b) a raised to the power of b.	pow (a,b)	a= 5 b= 2 print (pow (a,b)) **Output:** 25

37 a)	**STRING OPERATORS**
	Python provides the following string operators to manipulate string.
	(i) Concatenation (+)
	Joining of two or more strings using plus **(+) operator** is called as **Concatenation**.
	Example
	>>> "welcome" + "Python"
	Output: 'welcomePython'
	(ii) Append (+ =)
	Adding more strings at the end of an existing string using **operator** += is known as **append.**
	Example:
	>>> str1="Welcome to "
	>>> str1+="Learn Python"
	>>> print (str1)
	Output: ***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) **Output:** 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:
		5

37 b)	**Data abstraction** ➢ 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** **Constructor:** ➢ Constructors are functions that build the abstract data type. ➢ Constructors create an object, bundling together different pieces of information. ➢ For example, say you have an abstract data type called city. ➢ This city object will hold the city ‟s name, and its latitude and longitude. ➢ To create a city object, you use a function like **city = makecity (name, lat, lon).** ➢ Here makecity (name, lat, lon) is the constructor which creates the object city.	

	Selectors: ➢ Selectors are functions that retrieve information from the data type. ➢ Selectors extract individual pieces of information from the object. ➢ To extract the information of a city object, you would use functions like **getname(city)** **getlat(city)** **getlon(city)** These are the selectors because these functions extract the information of the city object.	
38 a)	**Nested tuple** **Tuple:** ➢ 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. **Nested Tuples:** ➢ In Python, a tuple can be defined inside another tuple; called Nested tuple. ➢ In a nested tuple, each tuple is considered as an element. ➢ The for loop will be useful to access all the elements in a nested tuple. **Example:**	5

38 b)	**CONSTRUCTOR:**
	➢ **"init"** is a special function begin and end with double underscore in Python act as a Constructor.
	➢ Constructor function will automatically executed when an object of a class is created.
	➢ **General format of constructor:**
	def __init__(self, [args ……..]):
	<statements>
	DESTRUCTOR:
	➢ Destructor is also a special method gets executed automatically when an object exit from the scope.
	➢ In Python, __del__( ) method is used as destructor.
	➢ **General format of destructor:**
	def __del__(self):
	<statements>	

T. Josephine Agnel. M.Sc., B.Ed.,
Computer Instructor
St. Paul's Mat.Hr.Sec.School,
Block – 4, Neyveli
Cell : 8667577622