केन्द्रीय विद्यालय संगठन ,

KENDRIYA VIDYALAYA SANGATHAN,

एर्नाकुलम क्षेत्र

ERNAKULAM REGION

2022-23

COMPUTER SCIENCE (083)

STUDENT SUPPORT MATERIAL

Based on the latest CBSE Exam Pattern for the Session 2022-23

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Date : 26/09/2022

MESSAGE FROM DEPUTY COMMISSIONER

It gives me immense pleasure to publish the study material for Class XII Computer Science (083). I am sure that the support material will definitely be of great help to the class XII students of all Kendriya Vidyalayas of our region.

This Students' Support Material has been prepared to improve their academic performance. This is a product of the combined efforts of a team of dedicated and experienced teachers with expertise in their subjects. This material is designed to supplement the NCERT text book.

The Support Material contains all the important aspects required by the students. Care has been taken to include the latest syllabus, summary of all the chapters, Sample question papers, problem solving and case-based questions. It covers all essential components that are required for quick and effective revision of the subject.

I would like to express my sincere gratitude to the in- charge Principal and all the teachers who have persistently striven for the preparation of this study material. Their selfless contribution in making this project successful is commendable.
"An ounce of practice is worth tons of knowledge", students will make use of this material meticulously to reap the best out of this effort.

With Best Wishes

**(R SENTHIL KUMAR)
DEPUTY COMMISSIONER**

CONTENT AND REVIEW

BY PGT COMPUTER SCIENCE OF ERNAKULAM REGION

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Computer Science
CLASS-XII
Code No. 083
2022-23

1. Prerequisites
Computer Science- Class XI

2. Learning Outcomes
Student should be able to
   a) apply the concept of function.
   b) explain and use the concept of file handling.
   c) use basic data structure: Stacks
   d) explain basics of computer networks.
   e) use Database concepts, SQL along with connectivity between Python and SQL.

3. Distribution of Marks:

Unit No.	Unit Name	Marks	Periods	
			Theory	Practical
I	Computational Thinking and Programming - 2	40	70	50
II	Computer Networks	10	15	---
III	Database Management	20	25	20
	Total	70	110	70

4. Unit wise Syllabus

Unit I: Computational Thinking and Programming – 2

- Revision of Python topics covered in Class XI.
- 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)
- Introduction to files, types of files (Text file, Binary file, CSV file), relative and absolute paths
- Text file: opening a text file, text file open modes (r, r+, w, w+, a, a+), closing a text file, opening a file using with clause, writing/appending data to a text file using write() and writelines(), reading from a text file using read(), readline() and readlines(), seek and tell methods, manipulation of data in a text file

- Binary file: basic operations on a binary file: open using file open modes (rb, rb+, wb, wb+, ab, ab+), close a binary file, import pickle module, dump() and load() method, read, write/create, search, append and update operations in a binary file
- CSV file: import csv module, open / close csv file, write into a csv file using csv.writer() and read from a csv file using csv.reader( )
- Data Structure: Stack, operations on stack (push & pop), implementation of stack using list.

Unit II: Computer Networks

- Evolution of networking: introduction to computer networks, evolution of networking (ARPANET, NSFNET, INTERNET)
- Data communication terminologies: concept of communication, components of data communication (sender, receiver, message, communication media, protocols), measuring capacity of communication media (bandwidth, data transfer rate), IP address, switching techniques (Circuit switching, Packet switching)
- Transmission media: Wired communication media (Twisted pair cable, Co-axial cable, Fiber-optic cable), Wireless media (Radio waves, Micro waves, Infrared waves)
- Network devices (Modem, Ethernet card, RJ45, Repeater, Hub, Switch, Router, Gateway, WIFI card)
- Network topologies and Network types: types of networks (PAN, LAN, MAN, WAN), networking topologies (Bus, Star, Tree)
- Network protocol: HTTP, FTP, PPP, SMTP, TCP/IP, POP3, HTTPS, TELNET, VoIP
- Introduction to web services: WWW, Hyper Text Markup Language (HTML), Extensible Markup Language (XML), domain names, URL, website, web browser, web servers, web hosting

Unit III: Database Management

- Database concepts: introduction to database concepts and its need
- Relational data model: relation, attribute, tuple, domain, degree, cardinality, keys (candidate key, primary key, alternate key, foreign key)
- Structured Query Language: introduction, Data Definition Language and Data Manipulation Language, data type (char(n), varchar(n), int, float, date), constraints (not null, unique, primary key), create database, use database, show databases, drop database, show tables, create table, describe table, alter table (add and remove an attribute, add and remove primary key), drop table, insert, delete, select, operators (mathematical, relational and logical), aliasing, distinct clause, where clause, in, between, order by, meaning of null, is null, is not null, like, update command, delete command, aggregate functions (max, min, avg, sum, count), group by, having clause, joins: cartesian product on two tables, equi-join and natural join

- Interface of python with an SQL database: connecting SQL with Python, performing insert, update, delete queries using cursor, display data by using fetchone(), fetchall(), rowcount, creating database connectivity applications

REVIEW OF PYTHON

LET US REVISE THE CONCEPTS THAT WE LEARNED IN CLASS XI

Characteristics of Python:

1. Python is Object-Oriented
   Python supports concepts such as polymorphism, operator overloading and multiple inheritance.
2. Indentation
   Indentation is one of the greatest features in python – indentation identifies the blocks of code.
3. Open source Programming Language
   Python is an open source programming language.
   It can be freely downloaded. Installing python is free and easy
4. It's Powerful
   - Dynamic typing
   - Built-in types and tools
   - Library utilities
   - Third party utilities (e.g. NumPy, SciPy)
   - Automatic memory management
5. It's Portable and Platform independent
   - Python runs virtually in every major platform used today
   - As long as you have a compatible python interpreter installed, python programs will run in exactly the same manner, irrespective of platform.
6. It's easy to use and learn
   - No intermediate compiler
   - Python Programs are compiled automatically to an intermediate form called byte code, which the interpreter then reads.
   - This gives python the development speed of an interpreter without the performance loss inherent in purely interpreted languages.
   - Structure and syntax are pretty intuitive and easy to grasp.
7. Interpreted Language
   Python is processed at runtime by python Interpreter
8. Interactive Programming Language
   Users can interact with the python interpreter directly for writing the programs
9. Straight forward syntax
   The formation of python syntax is simple and straight forward which also makes it popular.

Character Set of Python:

Set of all characters recognised by python. It can be any alphabet, digit or any symbol.
Python uses ASCII character set.
Python Supports the following character set:
Letters: A- Z and a -z
Digits: 0-9
Special Symbols: + , - , /, % , ** , * , [ ], { }, #, $ etc.
White spaces: Blank space, tabs, carriage return, newline, form feed
Other Characters: All ASCII and UNICODE characters.

Tokens:

Tokens are smallest identifiable units.
Different tokens are:

- Keywords: reserved words which are having special meaning.
- Examples: int, print, input, for, while
- Identifiers: name of given by the user to identify variables, functions, constants, etc.
- Literals: literals are constant values. It can be numeric or non-numeric
- Operators: triggers an operation. Parameters provided to the operators are called
    - operands
    - Examples: + - * % ** / //
- Delimiters: Symbols used as separators.
    - Examples: {} , [ ] ; :

Rules for identifier names:

- Keywords and operators are not to be used
- Start with an alphabet or an underscore.
- Special characters other than underscores are allowed.
- Space is not allowed.
- Cannot start with a number.
- Note: Python is case sensitive and hence uppercase and lowercase are treated differently.
- Example:
    - engmark, _abc , mark1, mark2

Variables and data types:

Variables are used to store data. In Python a variable is an object. Variables are nothing but reserved memory locations to store values. This means that when you create a variable you reserve some space in memory. Memory locations are addressable.

The data stored in memory can be of many types. For example, a student roll number is stored as a numeric value and his or her address is stored as alphanumeric characters. Python has various standard data types that are used to define the operations possible on them and the storage method for each of them. Some are mutable and some are immutable.

- Numeric Types: int, float, complex
- Boolean – True or False values. Used when comparisons are made and the result can be expressed as True or False
- None – a special type with an unidentified value or absence of value.
- Sequence: an ordered collection of elements. String, List and Tuples are sequences. Items/elements are Identified by its index.
- Sets – an unordered collection of any type without duplicate entry.
- Mappings – Dictionaries are mappings. Elements of dictionaries are key-value pairs. Keys are used to access values. Keys are immutable.

Based on the data type of a variable, the interpreter allocates memory and decides what can be stored in the reserved memory. Therefore, by assigning different data types to variables, you can store integers, decimals or characters in these variables.

Mutable and Immutable types:

If the values can be changed after creating the variable and assigning values, then it is called **mutable**. If the value assigned cannot be changed after creating and initializing it, then it is known as **Immutable**.
When an attempt is made to update the immutable type, a new memory location is used with name remaining the same.

Assigning Values to Variables:

Python variables do not need explicit declaration to reserve memory space. The declaration happens automatically when you assign a value to a variable. The assignment operator (=) is used to assign values to variables.
The operand to the left of the = operator is the name of the variable and the operand to the right of the = operator is the value stored in the variable.
For example –
a= 100 #an integer is signed
b = 1000.0 # A floating point value
c = "John"   # A string
d = ''' Hello   world
        good morning'''   # multi line string

Multiple Assignments:

Python allows you to assign a single value to several variables simultaneously.

For example: a = b = c = 1
Here, an integer object is created with the value 1, and all three variables are assigned to the same memory location. You can also assign multiple objects to multiple variables.

For example –
a,b,c = 1,2,"kvsch"
Here, two integer objects with values 1 and 2 are assigned to variables a and b respectively, and one string object with the value "john" is assigned to the variable c.
Also, it is possible to define and initialize multiple variables with different values as given below
a, b, c = 5,10,20
The above instruction will create three variables named a,b,c and initialize them with values 5, 10 20 respectively.

Output Variables:

The Python print statement is often used to output variables.Variables do not need to be declared with any particular type. Different type of data can be assigned even after initializing them with some type of data.
x = 5   # x is of type int
x = "kve "   # x is now of type str print(x)
Output: kve

To combine both text and a variable, Python uses the "+" character:
Example
     x = "awesome"
    print("Python is " + x)
Output of the above code is:
    Python is awesome

You can also use the + character to add a variable to another variable:
Example
    x = "Python is "
    y = "awesome"
    z = x + y print(z)
 Output:
    Python is awesome

Expressions:

An expression is a combination of values, variables, and operators.

An expression is evaluated using assignment operator.

Examles: Y=x + 17

```
>>> x=10
>>> z=x+20
>>> z
30

>>> x=10
>>> y=20
>>> c=x+y
>>> c
30
```

A value all by itself is a simple expression, and so is a variable.

```
>>> y=20
>>> y
20
```

Python also defines expressions with identifiers, literals, and operators. So,

Operators:

In Python you can implement the following operations using the corresponding operators. Operators trigger an operation. Some operators need one operand, some need more than one operand to perform the operation.

Python supports different types of operators including Arithmetic Operators, Relational Operators, Logical Operators etc.

Operator	Token
addition	+
subtraction	-
multiplication	*
Integer Division	/
remainder	%
Binary left shift	<<

Binary right shift	>>
and	&
or	\
Less than	<
Greater than	>
Less than or equal to	<=
Greater than or equal to	>=
Check equality	==
Check not equal	!=

Statements:

A statement is an instruction that the Python interpreter can execute. We have normally two basic statements, the assignment statement and the print statement. Some other kinds of statements that are if statements, while statements, and for statements generally called as control flows.

Examples:
An assignment statement creates new variables and gives them values:

```
>>> x=10
>>> school="kve"
```

A 'print' statement is to display something on the screen/monitor. We use the print() function for this purpose. And input() function is used to receive the input from the user through the keyboard.

Precedence of Operators:

Operator precedence affects how an expression is evaluated. Each operator is having a priority when used in an expression in combination with other operators.
For example, x = 7 + 3 * 2;
here, x is assigned 13, not 20 because operator * has higher precedence than +, so it first multiplies 3*2 and then adds into 7.
Example 1:
```
>>> 3+4*2 11
```
Multiplication gets evaluated before the addition operation

>>> (10+10)*2 40

Parentheses () overriding the precedence of the arithmetic operators

Example 2:

a = 20

b = 10

c = 15

d = 5

e = 0

e = (a + b) * c / d   #(30 * 15) / 5

print("Value of (a + b) * c / d is ", e)

e = ((a + b) * c) / d   # (30 * 15) / 5

print("Value of ((a + b) * c) / d is ", e)

e = (a + b) * (c / d)   # (30) * (15/5)

print("Value of (a + b) * (c / d) is ", e)

e = a + (b * c) / d; # 20 +(150/5)

print("Value of a + (b * c) /d is", e)

Output:

Value of (a + b) * c / d is 90.0

Value of ((a + b) * c) / d is 90.0

Value of (a + b) * (c / d) is 90.0

Value of a + (b * c) /d is 50.0

Comments:

Comments are discarded by the Python interpreter. Comments acts as some message to the

Programmer. It can be used as documents.

Single-line comments begins with a hash(#) symbol and is useful in mentioning that the whole line should be considered as a comment until the end of line.

A Multi line comment is useful when we need to comment on many lines. In python, triple double quote(" " ") and single quote(' ' ')are used for multi-line commenting.

Example:

   # this is a single line comment

   ''' I am a multi line comment'''

Errors and Exceptions:

Python Errors and Built-in Exceptions: Python (interpreter) raises exceptions when it encounters errors. When writing a program, we, more often than not, will encounter errors. Error caused by not following the proper structure (syntax) of the language is called syntax error or parsing error.

ZeroDivisionError: ZeroDivisionError in Python indicates that the second argument used in a division (or modulo) operation was zero.

Overflow Error: OverflowError in Python indicates that an arithmetic operation has exceeded the limits of the current Python runtime. This is typically due to excessively large float values, as integer values that are too big will opt to raise memory errors instead.

Import Error: It is raised when you try to import a module which does not exist. This may happen if you made a typing mistake in the module name or the module doesn't exist in its standard path. In the example below, a module named "non_existing_module" is being imported but it doesn't exist, hence an import error exception is raised.

Index Error: An IndexError exception is raised when you refer a sequence which is out of range. In the example below, the list abc contains only 3 entries, but the 4th index is being accessed, which will result an IndexError exception.

Type Error: When two unrelated type of objects are combined, TypeErrorexception is raised.In example below, an int , and a string is added, which will result in TypeError exception.

Indentation Error: Unexpected indent - As mentioned in the "expected an indented block" section, Python not only insists on indentation, it insists on consistent indentation. You are free to choose the number of spaces of indentation to use, but you then need to stick with it.

Syntax errors: These are the most basic type of error. They arise when the Python parser is unable to understand a line of code. Syntax errors are almost always fatal, i.e. there is almost never a way to successfully execute a piece of code containing syntax errors

Run-time error: A run-time error happens when Python understands what you are saying, but runs into trouble when following your instructions.

Key Error : Python raises a KeyError whenever a dict() object is requested (using the format a= adict[key]) and the key is not in the dictionary.

Value Error: In Python, a value is the information that is stored within a certain object. To encounter a ValueError in Python means that is a problem with the content of the object you tried to assign the value to.

Python has many built-in exceptions which forces your program to output an error when something in it goes wrong. In Python, users can define such exceptions by creating a new class. This exception class has to be derived, either directly or indirectly, from Exception class.

Different types of exceptions:

- ArrayIndexOutOfBoundException.
- ClassNotFoundException.
- FileNotFoundException.
- IOException.
- InterruptedException.
- NoSuchFieldException.
- NoSuchMethodException

Modules:

Python module can be defined as a python program file which contains a python code including python functions, class, or variables. In other words, we can say that our python code file saved with the extension (.py) is treated as the module. We may have a runnable code inside the python module. A module in Python provides us the flexibility to organize the code in a logical way. To use the functionality of one module into another, we must have to import the specific module.

Syntax:

import <module-name>

Every module has its own functions, those can be accessed with . (dot)

Note: In python we have help ()

Enter the name of any module, keyword, or topic to get help on writing Python programs and using Python modules. To quit this help utility and return to the interpreter, just type "quit".

Some of the modules like os, date, and calendar so on……

>>> import sys
>>> print (sys.version)
3.8.0 (tags/v3.8.0:fa919fd, Oct 14 2019, 19:21:23) [MSC v.1916 32 bit (Intel)]

>>> print(sys.version_info)

sys.version_info(major=3, minor=8, micro=0, release level='final', serial=0)

```
>>> print(calendar.isleap(2020))
True
>>> print(calendar.isleap(2017))
False
```

Control Structures

Flow of execution means the way in which the instructions are executed. It can be
1.   Sequential execution
2.   Selection/ Conditional statements
3.   Iterations/loop

Sequential execution means executing the statements one by one starting from the first instruction onwards.

Selection:

Selection or Conditional statements helps us to execute some statements based on whether the condition is evaluated to True or False.

Use of if statement:
The if statement contains a logical expression using which data is compared and a decision is made based on the result of the comparison.

Syntax:
if <expression>:
    statement(s)

If the boolean expression evaluates to TRUE, then the block of statement(s) inside the if statement is executed. If boolean expression evaluates to FALSE, then the first set of code after the end of the if statement(s) is executed.

Flow chart representing the execution of 'if' statement:
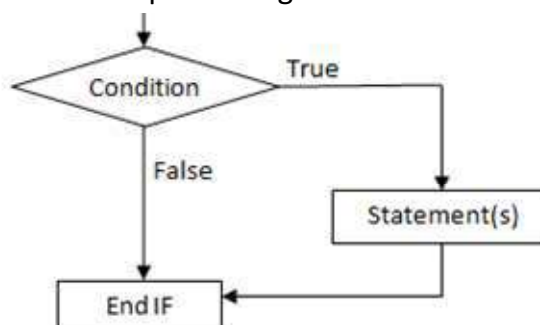
Example: Python if Statement
```
a = 3
if a > 2:
    print(a, "is greater")
     print("done")
a = -1
if a < 0:
    print(a, "a is smaller")
    print("Finish")
```

Output:
```
3 is greater
done
-1 a is smaller
Finish
```

```
a=10
if a>9:
    print("A is Greater than 9")
Output:
A is Greater than 9
```

Alternative if (If-else):

An else statement can be combined with an if statement. An else statement contains the block   of code (false block) that executes if the conditional expression in the if statement resolves to 0 or a FALSE value.

The else statement is an optional statement and there could be at most only one else Statement following if.

Syntax of if - else:
```
if test expression:
      Body of if stmts
else:
      Body of else
```

Flow Chart:
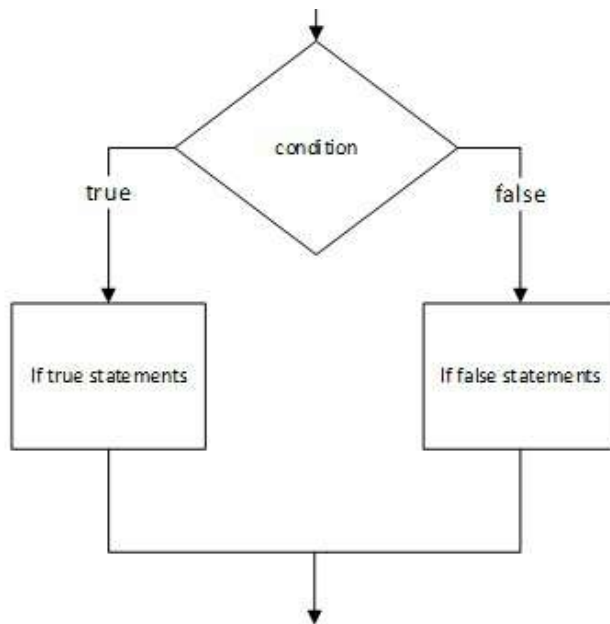
Example of if - else:

```
a=int(input('enter the number'))
if a>5:
        print("a is greater")
else:
        print("a is smaller than the input given")
```

Output:

enter the number 2

a is smaller than the input given

```
a=10 b=20
if a>b:
  print("A is Greater than B")
else:
   print("B is Greater than A")
```

Output:

B is Greater than A

## *Chained Conditional: (If-elif-else):*

The elif statement allows us to check multiple expressions for TRUE and execute a block of code as soon as one of the conditions evaluates to TRUE. Similar to the else, the elif statement is optional. However, unlike else, for which there can be at most one statement, there can be an arbitrary number of elif statements following an if.

**Syntax of if – elif - else :**

If  <test expression>:
     Body of if stmts
elif  < test expression>:
    Body of elif stmts
else:
     Body of else stmts

**Flow Chart:**
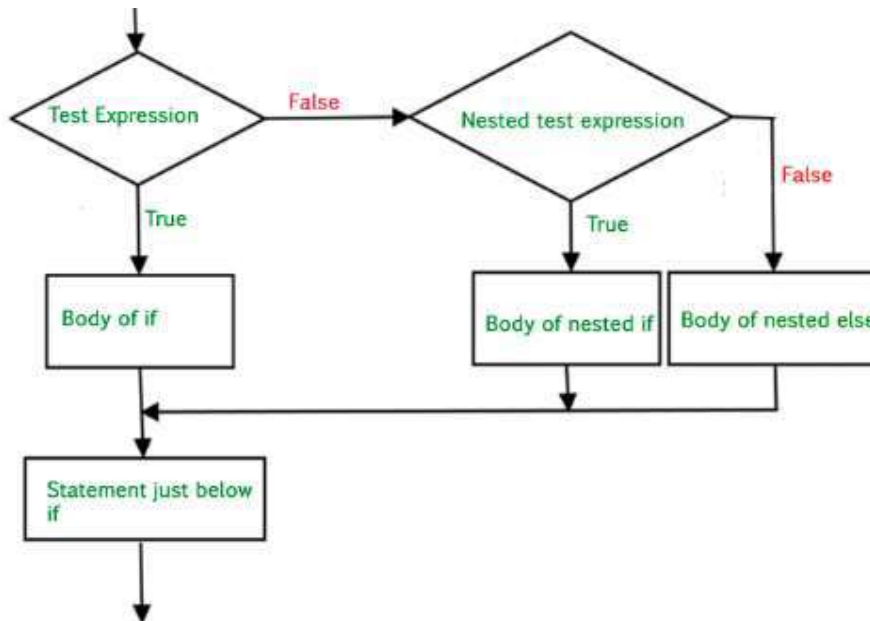


**Example of if - elif – else:**

```
a=int(input('enter the number'))
b=int(input('enter the number'))
c=int(input('enter the number'))
if a>b:
    print("a is greater")
elif b>c:
    print("b is greater")
else:
    print("c is greater")
```

Output:

enter the number 5
enter the number 2
enter the number 9
 a is greater
>>>
enter the number 2

enter the number 5
enter the number 9
 c is greater
----
var = 100
if var == 200:
    print("1 - Got a true expression value")
    print(var)
elif var == 150:
    print("2 - Got a true expression value")
    print(var)
elif var == 100:
    print("3 - Got a true expression value")
    print(var)
else:
    print("4 - Got a false expression value")
    print(var)
Output:
3 - Got a true expression value
100

Iteration/Repetition:

A loop statement allows us to execute a statement or group of statements multiple times as long as the condition is true. Repeated execution of a set of statements with the help of loops is called iteration.

Loops statements are used when we need to run same code again and again, each time with a different value.

In Python Iteration (Loops) statements are of three types:
- While Loop
- For Loop
- Nested For Loops

While loop:

Loops are either infinite or conditional. Python while loop keeps iterating a block of code defined inside it until the desired condition is met.
- The while loop contains a Boolean expression and the code inside the loop is repeatedly executed as long as the Boolean expression is true.
- The statements that are executed inside while can be a single line of code or a block of multiple statements

Syntax:
while(expression):
    Statement(s)

Flow Chart:
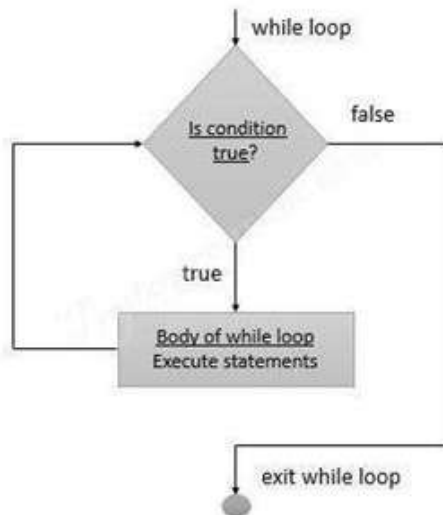
Example Programs:

```
i=1
while i<=6:
    print("KV School")
    i=i+1
```
Output:
KV School
KV School
KV School
KV School
KV School
KV School

_____

```
i=1
while i<=3:
  print("KV School",end=" ")
  j=1
  while j<=1:
     print("CS DEPT",end="")
     j=j+1
  i=i+1
  print()
```

Output:

KV School CS DEPT

KV School CS DEPT

KV School CS DEPT

For loop:

Python for loop is used for repeated execution of a group of statements for the desired number of times. It iterates over the items of lists, tuples, strings, the dictionaries and other iterable objects.

Syntax:

for <loopvariable> in <sequence>:

    Statement(s)

A sequence or iterable object is used to execute the loop. The for loop executes for a definite number of times. During each of the iteration, the loop variable holds a value from the sequence.

Example 1:

```
L = [ 1, 2, 3, 4, 5]
for var  in L:
    print( var, end=' ')

Output of the above code is:
 1 2 3 4 5
```

Example 2:

```
 for k in range(10):
     print(k, end =' , ')

 output:   0,1,2,3,4,5,6,7,8,9
```

Example 3:

```
 for   k in range(1, 10):
     if  k% 2 ==0:
         print(k, end = ' , ')
 Output:   2, 4, 6, 8
```

Example 4:

```
list = ['K','V','S','C','H']
i = 1
for item in list:
```

```
        print ('School ',i,' is ',item)
       i = i+1
Output:
School 1 is K
School 2 is V
School 3 is S
School 4 is C
School 5 is H
```

Example 5:
```
#Iterating over a Tuple:
tuple = (2,3,5,7)
print ('These are the first four prime numbers ')
#Iterating over the tuple
for a in tuple:
    print (a)

Output:
These are the first four prime numbers 2
3
5
7
```

Example 6:
```
# Iterating over a dictionary:
#creating a dictionary
college = {"ces":"block1","it":"block2","ece":"block3"}
#Iterating over the dictionary to print keys
print ('Keys are:')
 for keys in college:
        print (keys)
#Iterating over the dictionary to print values
print ('Values are:')
for blocks in college.values():
     print(blocks)

Output:
Keys are:
ces
it
```

ece
Values are:
block1
block2
block3

Example 7:
#Iterating over a String:
#declare a string to iterate over
college = 'KVSCH'
#Iterating over the string
for name in college:
    print (name)

Output:
K
V
 S
C
H

Nested For loop:

When one Loop is defined within another, it is called Nested Loops.

Syntax:
```
for val in sequence1:
        for val in sequence2:
                statements
```

```
# Example 1 of Nested For Loops (Pattern Programs)
for i in range(1,6):
    for j in range(0,i):
        print(i, end=" ")
    print('')
```
Output:
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5

```
# Example 2 of Nested For Loops (Pattern Programs)
for i in range(1,6):
    for j in range(5,i-1,-1):
        print(i, end=" ")
    print('')
```

Output:

```
1 1 1 1 1
2 2 2 2
3 3 3
4 4
5
```

Break and continue:

In Python, break and continue statements can alter the flow execution of a normal loop. Sometimes we wish to terminate the current iteration or even the whole loop without checking test expression/completing it. The break and continue statements are used in these cases.

'break:' statement

The break statement terminates the loop containing it and control of the program flows to the statement specified immediately after the body of the loop. If 'break' statement is written within a nested loop (loop inside another loop), break will terminate the innermost loop.

'continue' Statement

The 'continue' statement is used to skip the current iteration / rest of the code inside a loop for the current iteration only. Loop does not terminate but continues on with the next iteration.

'pass' statement:

In Python programming, pass is a null statement. The difference between a comment and

pass statement in Python is that, while the interpreter ignores a comment entirely, pass is not ignored. 'pass' is just a place holder for functionality to be added later.

Strings:

A string is a group/ a sequence of characters. Since Python has no provision for arrays, we simply use strings. A sequence of any type of characters enclosed within quotes, is a string. This is how we declare a string. We can use a pair of single or double quotes. Every string object is of the type 'str'.

```
>>> type("name")
<class 'str'>
```

```
>>> name=str()
>>>name
''
>>> a=str('kvsch')
>>> a
' kvsch'
>>> a=str(kvsch)
>>> a[2]
's'
>>> fruit = 'banana'
>>> letter = fruit[1]
```

The second statement selects character number 1 from fruit and assigns it to letter. The expression in brackets is called an index. The index indicates which character in the sequence we want.

String slices:

A segment or a part of a string is called a slice. Selecting a slice is similar to selecting a character:

Subsets of strings can be taken using the slice operator ([ ] and [:]) with indexes starting at 0 in the beginning of the string and working their way from -1 at the end.

Slice out substrings, sub lists, sub Tuples using index.

Syntax:

[Start: stop: steps]

- Slicing will start from index and will go up to stop in step of steps.
- Default value of start is 0,
- Stop is last index of list
- And for step default is 1

For example, 1:

```
str = 'Hello World!'
print (str) # Prints complete string
print (str[0] )# Prints first character of the string
print (str[2:5] ) # Prints characters starting from 3rd to 5th
print (str[2:]) # Prints string starting from 3rd character
print ( str * 2 )# Prints string two times
print (str + "TEST") # Prints concatenated string
```

Output:

```
Hello World!
H
llo
llo World!
```

Hello World!Hello World!
Hello World!TEST

Example 2:
>>> x='computer'
>>> x[1:4]
'omp'
>>> x[1:6:2]
'opt'
>>> x[3:]
puter
>>> x[:5]
'compu'
>>> x[-1]
'r'
>>> x[-3:]
'ter'
>>> x[:-2]
'comput'
>>> x[::-2]
'rtpo'
>>> x[::-1]
'retupmoc'

Note: strings are immutable, which means we can't change an   existing string.
The best we can do is create a new string that is a variation from the original:

String concatenation and repetition operators:

'+' is called concatenation operator. When both the operands are strings, it will combine them.

'*' is called repetition operator and it causes repetition of the characters the specified number of times.

String functions and methods:

There are many methods to operate on String.

S.no	Method name	Description
1.	isalnum()	Returns true if string has at least 1 character and all characters are alphanumeric and false otherwise.
2.	isalpha()	Returns true if string has at least 1 character and allcharacters are alphabetic and false otherwise.
3.	isdigit()	Returns true if string contains only digits and falseotherwise.
4.	islower()	Returns true if string has at least 1 cased character and all casedcharacters are in lowercase and false otherwise.
5.	isnumeric()	Returns true if a string contains only numericcharacters and false otherwise.
6.	isspace()	Returns true if string contains only whitespace characters and false otherwise.
7.	istitle()	Returns true if string is properly "titlecased" andfalse otherwise.
8.	isupper()	Returns true if string has at least one cased character and allcased characters are in uppercase and false otherwise.
9.	replace(old,new[, max])	Replaces all occurrences of old in string with new orat most max occurrences if max given.
10.	split()	Splits string according to delimiter str (space if notprovided) and returns list of substrings;
11.	count()	Occurrence of a string in another string
12.	find()	Finding the index of the first occurrence of a string inanother string
13.	swapcase()	Converts lowercase letters in a string to uppercaseand viceversa
14.	startswith(str,beg=0 , end=len(string))	Determines if string or a substring of string (if starting index beg and ending index end are given) starts with substring str; returns true if so and false otherwise.

List:

With the help of lists, we can store different types of items in a variable. It helps us to store collection of data. List items are ordered, changeable and can be repeated. Indexes are used to access the items.

Lists are mutable.

Python has a set of built-in methods that you can use on lists

Method	Description
append()	Adds an element at the end of the list
clear()	Removes all the elements from the list
copy()	Returns a copy of the list
count()	Returns the number of elements with the specified value
extend()	Add the elements of a list (or any iterable), to the end of the current list
index()	Returns the index of the first element with the specified value
insert()	Adds an element at the specified position
pop()	Removes the element at the specified position
remove()	Removes the first item with the specified value
reverse()	Reverses the order of the list
sort()	Sorts the list

Whenever we need an array, we can use lists. We can construct / create list in many ways.

Example 1:
list1=[1,2,3,'A','B',7,8,[10,11]]
print(list1)

output:
[1, 2, 3, 'A', 'B', 7, 8, [10, 11]]

Example 2:
x=list()
print(x)
output:
x []

Example 3:
Name = " abcdefg"
L = list(Name)
print(L)
Output:
['a', 'b', 'c', 'd', 'e', 'f', 'g']

Basic List Operations:

Lists respond to the + and * operators much like strings; they mean concatenation and repetition here too, except that the result is a new list, not a string.

Python Expression	Results	Description
len([1, 2, 3])	3	Length
[1, 2, 3] + [4, 5, 6]	[1, 2, 3, 4, 5, 6]	Concatenation
['Hi!'] * 4	['Hi!', 'Hi!', 'Hi!', 'Hi!']	Repetition
3 in [1, 2, 3]	True	Membership
for x in [1, 2, 3]: print x,	1 2 3	Iteration

Note: indexing and slicing are similar to that of strings.
For example:
L= ['kvsch', 'school', 'KVSCH!']

Python Expression	Results	Description
L[2]	KVSCH	Offsets start at zero
L[-2]	school	Negative: count from the right
L[1:]	['school', 'KVSCH!']	Slicing fetches sections

List slices: - Examples

```
>>> list1= [1,2,3,4,5,6,7,8,9,10]
>>> list1[1:]
Output: [2, 3, 4, 5, 6, 7, 8, 9, 10]
 >>>list1[:1]
 Output:[1]
```

```
>>> list1[2:5]
 Output: [3, 4, 5]
>>> list1[:6]
 Output: [1, 2, 3, 4, 5, 6]
>>>list1 [1:2:4]
 Output:[2]
>>> ist1[1:8:2]
 output: [2, 4, 6, 8]
```

List Comprehension:

This is a way to create a new list using an existing list.

Syntax:

NewList = [expression   for variable in iterableobject   if condition == True]

Example1:

```
list1=[x**2 for x in range(10)]
print(list1)
output:
[ 0,1,4,9,16,25,36,49,64,81]
```

Note: in the above given code, a new list named list1 is created using the expression x**2, where the for loop is used to assign different values to 'x' using the range( ) function.

Example 2:

```
x=[z**2  for z in range(10) if z>4]
print(x)
Output: [25, 36, 49, 64, 81]
```

Example 3:

```
x=[x ** 2 for x in range (1, 11)    if x % 2 == 1]
print(x)
Output: [1, 9, 25, 49, 81]
```

Tuples:

A tuple is a collection which is ordered and unchangeable. In Python tuples are created by enclosing items within round brackets.

- Supports all operations for sequences.
- Immutable, but member objects may be mutable.
- If the contents of a list shouldn't change, use a tuple to prevent items from accidently being added, changed, or deleted.

- Tuples are more efficient than list due to python's implementation.

We can create tuple in different ways.

X=( )   # an empty tuple

X=(1,2,3) # a tuple with three elements

X=tuple(list1)

X=1,2,3,4

Accessing elements of a tuple:

We can use index to access the elements of a tuple. From left to right, index varies from 0 to n-1, where n is total number of elements in the tuple. From right to left, the index starts with -1 and the index of the leftmost element will be –n, where n is the number of elements.

Syntax:

<Name of the tuple>[index]

Example:

T = (1, 2,4,6)

print(T[0])

Output: 1

print(T[--1])

Output: 6

Modifying the elements of a tuple:

Once created, we cannot modify the elements of a tuple. Tuple is immutable. If we try to modify the Element, it will generate 'TypeError'

Some important functions which can be used with tuple:

count (): Returns the number of times a specified value occurs in a tuple

Example:

>>> x=(1,2,3,4,5,6,2,10,2,11,12,2)

>>> x.count(2)

output: 4

index (): Searches the tuple for a specified value and returns its position in the tuple.

>>> x=(1,2,3,4,5,6,2,10,2,11,12,2)

>>> x.index(2)

Output: 1

(Or)

```
>>> x=(1,2,3,4,5,6,2,10,2,11,12,2)
>>> y=x.index(2)
>>> print(y)
Output: 1
```

len(): To know the number of items or values present in a tuple, we use len().
```
>>> x=(1,2,3,4,5,6,2,10,2,11,12,2)
>>> y=len(x)
>>> print(y)
output: 12
```

Tuple comprehension:

Tuple Comprehensions are special: The result of a tuple comprehension is special. You might expect it to produce a tuple, but what it does is produce a special "generator" object that we can iterate over.
For example:
```
>>> x = (i for i in 'abc') #tuple comprehension
>>> x
<generator object <genexpr> at 0x033EEC30>

>>> print(x)
<generator object <genexpr> at 0x033EEC30>
```

You might expect this to print as ('a', 'b', 'c') but it prints as <generator object <genexpr> at 0x02AAD710>. The result of a tuple comprehension is not a tuple: it is actually a generator. The only thing that you need to know now about a generator is that you can iterate over it, but ONLY ONCE.

Example:
```
>>> x = (i for i in 'abc')
>>> for i in x:
print(i)

Output:
a
b
c
```
Example:
Create a list of 2-tuples like (number, square):
```
>>> z=[(x, x**2) for x in range(6)]
```

```
>>> z
[(0, 0), (1, 1), (2, 4), (3, 9), (4, 16), (5, 25)]
```

Set comprehension:

Similarly, to list comprehensions, set comprehensions are also supported by Python:

```
Example:
>>> a = {x for x in 'abracadabra' if x not in 'abc'}
>>> a
Output:
{'r', 'd'}

>>> x={3*x for x in range(10) if x>5}
>>> x

Output:
{24, 18, 27, 21}
```

Note: In case of set, elements are enclosed within { }.

Dictionaries:

A dictionary is a collection which is unordered, changeable and indexed. In Python dictionaries are created with curly brackets, and they have keys and values. It is a mapping. Values can be of any type. Only immutable types are allowed as keys. It is not possible to repeat keys. They are to be unique.

- Key-value pairs
- Unordered

```
We can construct or create dictionary like:
X={1:'A',2:'B',3:'c'}X=dict([('a',3) ('b',4)]
X=dict('A'=1,'B' =2)
```

Example:
```
>>> dict1 = {"brand":"mrcet","model":"college","year":2004}
>>> dict1
{'brand': 'mrcet', 'model': 'college', 'year': 2004}
```

Functions available for handling dictionary:

Method	Description
clear()	Remove all items form the dictionary.
copy()	Return a shallow copy of the dictionary.
fromkeys(seq[, v])	Return a new dictionary with keys from seq and value equal to v (defaults to None).
get(key[,d])	Return the value of key. If key does not exit, return d (defaults to None).
items()	Return a new view of the dictionary's items (key,value).
keys()	Return a new view of the dictionary's keys.
pop(key[,d])	Remove the item with key and return its value or d if key is not found. If d is not provided and key is not found, raises KeyError.
popitem()	Remove and return an arbitary item (key, value). Raises KeyError if the dictionary is empty.
setdefault(key[,d])	If key is in the dictionary, return its value. If not, insert key with a value of d and return d (defaults to None).
update([other])	Update the dictionary with the key/value pairs from other, overwriting existing keys.
values()	Return a new view of the dictionary's values
remove():	It removes or pop the specific item of dictionary
del( )	Deletes a particular item
len( )	we use len() method to get the length of dictionary

Note: keys are used to access or modify the items of a dictionary.

Comprehension:

Dictionary comprehensions can be used to create dictionaries from arbitrary key and value expressions

Syntax:

    <dictionary> = { expression   for <variable> in sequence }

Example:
```
>>> z={x: x**2 for x in (2,4,6)}
>>> z
{2: 4, 4: 16, 6: 36}
>>> dict11 = {x: x*x for x in range(6)}
>>> dict11
{0: 0, 1: 1, 2: 4, 3: 9, 4: 16, 5: 25}
```

Important Points to remember:

- Data types: int, float, complex, Boolean, string, list, tuple, set, dictionary
- Variables are used to hold data. They are having memory address and values of particular types are stored.
- It is not possible to modify immutable types/objects.
- Mutable objects/types can be modified.
- Dictionary uses keys to identify values. Key can be of any immutable type and is not possible to change or duplicate.
- Values of a dictionary can be of any type.
- Three different programming constructs supported by Python are Sequence, Selection, and Iteration.
- For selection, Python uses if, if..else,   and if,,,elif…elif,,,else constructs.
- Different types of loops are while loop and for loop.
- While loop will continue till the specified number of times or till the given test expression is True.
- 'for' loop is used when we have to iterate over a sequence. How many times it is to be repeated is Known.
- Strings are sequence of characters. If enclosed in single or double quotes, it must be confined to a line.
- String enclosed within triple quotes can be of multiple lines and are also called as docstrings.
- List comprehension is a way to create a new list using an existing sequence.
- Examples for immutable types: int, float, string, tuple
- Examples for mutable types: list

Multiple Choice Questions

1. Which of the following is not a keyword?

   a) Eval   b) assert   c) nonlocal   d) pass

2. What is the order of precedence in python?

   (i) Parentheses   ii) Exponential   iii) Multiplication iv) Division   v) Addition   vi)

   Subtraction

   a) i,ii,iii,iv,v,vi
   b) ii,i,iii,iv,v,vi
   c) ii,i,iv,iii,v,vi
   d) i,ii,iii,iv,vi,v

3. What error occurs when you execute the following Python code snippet?

   apple = mango
   a) SyntaxError
   b) NameError
   c) ValueError
   d) TypeError

4. Find the output.
   ```
   def example(a):
       a = a+2
         a=a*2
    return a
    >>>example("hello")
   ```

   a. indentation Error
   b. cannot perform mathematical operation on strings
   c. hello2
   d. hello2hello2

5. What will be the value of X in the following Python expression?
   X = 2+9*((3*12)-8)/10

   a) 30.0
   b) 30.8
   c) 28.4
   d) 27.2

6. Select all options that print. hello-how-are-you

a. print('hello', 'how', 'are', 'you')
b. print('hello', 'how', 'are', 'you' + '-' * 4)
c. print('hello-' + 'how-are-you')
d. print('hello' + '-' + 'how' + '-' + 'are' + 'you')

7. Which of the following can be used as valid variable identifier(s) in Python?

a. total
b. 7Salute
c. Que$tion
d. global

8. Which of the following statement is correct for an AND operator?
   a) Python only evaluates the second argument if the first one is False
   b) Python only evaluates the second argument if the first one is True
   c) Python only evaluates True if any one argument is True
   d) Python only evaluates False if any one argument is False

9. Which of the following forces an expression to be converted into specific type?
   a) Implicit type casting   b) Mutable type casting
   c) Immutable type casting   d) Explicit type casting

10. Which point can be considered as difference between string and list?

   a. Length   c. Indexing and Slicing
   b. Mutability   d. Accessing individual elements

11. Which of the following statement is true for extend () list method?
   a) adds element at last   c) adds multiple elements at last
   b) adds element at specified index   d) adds elements at random index

12. The statement del l[1:3] do which of the following task?
   a) delete elements 2 to 4 elements from the list
   b) delete 2nd and 3rd element from the list
   c)deletes 1st and 3rd element from the list
   d)deletes 1st, 2nd and 3rd element from the list

13. If l=[11,22,33,44], then output of print(len(l)) will be
   a)4   b)3   c) 8   d) 6

14. Which of the following method is used to delete element from the list?
   a)del()
   b)delete()
   c)pop()
   d)All of these

15. The step argument in range() function_____.
   a. indicates the beginning of the sequence

b. indicates the end of the sequence

c. indicates the difference between every two consecutive numbers in the sequence

d. generates numbers up to a specified value

Answers of MCQ:
    1) A 2)A 3)B 4)A 5)D 6)C 7)A 8)B 9) D 10)B 11)B 12)B 13)A 14)C
    15)C

Very Short Answer Type Questions

1. Give the output of the following

   ```
   Sum = 0
   for k in range(5):
        Sum = Sum+k
   print(Sum)
   ```

2. Give the output of the following

   ```
   Sum = 0
   for k in range(10 , 1, -2):
      Sum = Sum+k
   print(Sum)
   ```

3. Give the output of the following

   ```
   for k in range(4):
      for j in range(k):
          print('*', end = ' ')
      print()
   ```

4. Give the output of the following

   ```
   for k in range(5,0, -1):
      for j in range(k):
          print('*', end=' ')
      print()
   ```

5. How many times the following loop will execute? Justify your answer
   ```
   A = 0
   while True:
      print(A)
      A =A+1
   ```

6. Give the output of the following. Also find how many times the loop will execute.

   ```
   A = 0
   while A<10:
   ```

```
print(A, ' , ')
A =A+1
```

7. Give the output of the following. Also find how many times the loop will execute.
```
A = 0
while A<10:
    print(A, ' , ')
    A =A+1
print('\n', A)
```

8. Give the output of the following

```
T = (5)
T = T*2
print(T)
```

9. Give the output of the following
```
T = (5, )
T = T*2
print(T)
```

10. What kind of error message will be generated if the following code is executed
```
A = 5
B = 'hi'
d = A+B
print(D)
```

11. Give the output of the following
```
L = [1,2,3,4,5,6,7,8,9]
print(L[:])
```

12. Give the output of the following
```
L = [1,2,3,4,5,6,7,8,9]
print(L[: -1])
```

13. Find the output of the following

```
S = 'abcdefgh'
L = list(S)
print(L[1:4])
```

14. Give the output of the following
```
L = [1,2,3,4,5,6,7,8,9]
print(L.count(2))
print(L.index(2)
```

15. Write python code to sort the list, L, in descending order.

16. Give the output of the following

```
x=[4,5,66,9]
y=tuple(x)
```

print(y)

Answers for VSA Questions

1)10
2)30
3)
```
   *
   * *
   * * *
```

4) * * * * *
```
   * * * *
   * * *
   * *
   *
```
5)infinite loop. Condition / test expression is always Ture.

6) 0,1,2,3,4,5,6,7,8,9

7) 0,1,2,3,4,5,6,7,8,9
   10

8) 10 Note: here T is an integer

9) (5, 5), Note: here T is tuple

10)TypeError

11) [1,2,3,4,5,6,7,8,9]

12) [1,2,3,4,5,6,7,8]

13) ['b', 'c', 'd']

14) 1
     1

15) L.sort(reverse= True)
16) (4, 5, 66, 9)

Short Answer Type Questions

1.Consider the following dictionary 'D'. Display all the items of the dictionary as individual tuple
   D = {'A': 20, 'B': 30, 'C':40. 'D': 50}

2.Write Python code to remove an element as entered by the user form the list, L

3.Create a list k, by selecting all the od numbers within the given range, m and n. User will input the values of m , n at run time

4.Write Python code to create and add items to a dictionary. Ask the user to input key value pairs. Continue as long as the user wishes.

5**.**Write Python code to find whether the given item is present in the given list using for loop.

6.Create a list, L, with the squares of numbers from 0 to 10

7.Mr. Rahul wants created a dictionary to store the details of his students and to manipulate thedata.

He wrote a code in Python, help him to complete the code:

```
studentDict = _____ # stmt 1
n = int(input("How Many Students you Want To Input?"))
for i in range(_____):  # stmt 2 - to enter n number of students data
        rollno = input("Enter Roll No:")

            name = input("Enter Name:")
        physicsMarks = int(input("Enter Physics Marks:"))
            chemistryMarks = int(input("Enter Chemistry Marks:"))
        mathMarks = int(input("Enter Maths Marks:"))

            studentDict[rollno]=_____ # stmt 3
```

Answers /Hints: Short answer Type Questions.
1) for k in D.items():
        print(k)

2) a =int('input the item to be deleted')
   l.remove(a)

3) m = int(input('lower limit'))
   n = int(input('upper limit'))
   n = n+1
   L = [x for x in range(m, n) if x%2!=0]
4)
   D = { }
   while Ture:
        K = input('type a key')
        V = int(input('type the value')
        D[K] = V
        C = input('type 'y' to add more')

```
                if C!='y':
                        break
5)       flag = 0
         L = eval(input('input a list on numbers'))
         E = int(input('item to be searched')
         K =len(L)
         for p in range(K):
                if E ==L(p):
                        flag = 1
                        print('found and index is  ',p)
         if flag==0:
                print('not found')
6)
     list1=[]
    for x in range(10):
       list1.append(x**2)

     list1
    Output:
     [0, 1, 4, 9, 16, 25, 36, 49, 64, 81]
    OR
    list1=list(map(lambda x:x**2, range(10)))
7)

   Statement 1 : StudentDict = dict( )

   Statement 2 = for i in range( n ):

   Statement 3: studentDict[rollno]=[name, physicsMarks, chemistryMarks, mathMarks]
```

FUNCTIONS

A function is a block of code that performs a specific task.
A function usually performs a single task of a large program.
Functions help in the division of our program into smaller, modular portions known as divide and conquer approach

FUNCTION DEFINITION

A function is a named sequence of statement(s) that performs a computation. It contains line of code(s) that are executed sequentially from top to bottom by Python interpreter. They are the most important building blocks for any software in Python.

Functions can be categorized as –

  i. Built-in functions
  ii. Functions defined in module
  iii. User defined functions

a) Built-in functions

Built in functions are the function(s) that are built into Python and can be accessed by a programmer.

These are always available and for using them, we don't have to import any module (file).

Name of the function	Description	Example
abs (x)	It returns distance between x and zero, where x is a numeric expression.	>>>abs(-45) 45 >>>abs(119) 119
max(x, y, z,....)	It returns the largest of its arguments: where x, y and z are numeric variable/expression.	>>>max(80, 100, 1000) 1000 >>>max(-80, -20, -10) -10
min(x, y, z, ...)	It returns the smallest of its arguments; where x, y, and z are numeric Variable/expression.	>>> min(80, 100, 1000) 80 >>>min(-80, -20, -10) -80

Name............of the function	Description	Example
abs (x)	It returns distance between x and zero, where x is a numeric expression.	>>>abs(-45) 45 >>>abs(119) 119
max(x, y, z,....)	It returns the largest of its arguments: where x, y and z are numeric variable/expression.	>>>max(80, 100, 1000) 1000 >>>max(-80, -20, -10) -10
min(x, y, z, ...)	It returns the smallest of its arguments; where x, y, and z are numeric Variable/expression.	>>> min(80, 100, 1000) 80 >>>min(-80, -20, -10) -80
cmp(x, y)	It returns the sign of the difference of two numbers: -1 if x < y, 0 if x == y, or 1 if x > y, where x and y are numeric variable/expression.	>>>cmp(80,100) -1 >>>cmp(180, 100) 1
divmod (x,y)	Returns both quotient and remainder by division through a tuple, when x is dividedby y; where x & y are variable/expression.	>>> divmod (14,5) (2,4) >>>divmod (2.7, 1.5) (1.0, 1.20000)
range(start,stop[, step])	This is a versatile function to create lists containing arithmetic progressions. It is most often used in for loops. The arguments must be plain integers. If the step argument is omitted, it defaults to 1. If the start argument is omitted, it defaults to 0. The full form returns a list of plain integers [start,start + step, start + 2 * step, ...]. Step must not be zero (or else Value Error is raised).	>>> range(10) [0, 1, 2, 3, 4, 5, 6, 7, 8, 9] >>> range(1, 11) [1,2, 3, 4, 5,6, 7, 8, 9, 10] >>>range(0, 30, 5) [0, 5, 10,15,20, 25] >>> range(0, 10, 3) [0,3, 6, 9] >>> range(0, -10, -1) [0,-1,-2, -3, -4, -5, -6, -7, -8, -9] >>> range(0) - [] >>> range(1, 0) - []
round(x [, n])	It returns float x rounded to n digits from the decimal point, where x and n are numeric expressions. If n is not provided then x is rounded to 0 decimal digits.	>>>round(80.23456, 2) 80.23 >>>round(-100.000056, 3) -100.0 >>> round (80.23456) 80

b) Functions defined in module

A module is a file containing Python definitions (i.e., functions) and statements.

Standard library of Python is extended as module(s) to a programmer. Definitions from the module can be used within the code of a program. To use these modules in the program, a programmer needs to import the module.

How to import a module

There are many ways to import a module in your program, they are:

- ◉ Import
- ◉ From

Import

It is simplest and most common way to use modules in our code. Its syntax is:

import modulename1 [, modulename2,   ]

Example

>>> import math

To use/ access/invoke a function, you will specify the module name and name of the function- separated by dot (.). This format is also known as dot notation.

Example

>>> value= math. sqrt (25) # dot notation

From Statement

It is used to get a specific function in the code instead of the complete module file. If we know beforehand which function(s), we will be needing, then we may use from. For modules having large no. of functions, it is recommended to use from instead of import.

Its syntax is:

>>> from modulename import functionname [, functionname…..]

>>>from modulename import * (Import everything from the file)

Example

>>> from math import sqrt

value = sqrt (25)

Some functions from math module are:

Name of function	Description	Example
ceil(x)	It returns the smallest integer not less than x, where x is a numeric expression.	math.ceil(-45.17) -45.0 math.ceil(100.12) 101.0 math.ceil(100.72) 101.0
floor(x)	It returns the largest integer not greaterthan x, where x is a numeric expression.	math.floor(-45.17) -46.0 math.floor(100.12) 100.0 math.floor(100.72) 100.0
fabs(x)	It returns the absolute value of x, where xis a numeric value.	math.fabs(-45.17) 45.17 math.fabs(100.12) 100.12 math.fabs(100.72) 100.72
exp(x)	It returns exponential of x:e x, where x isa numeric expression.	math.exp(-45.17) 2.41500621326e-20 math.exp(100.12) 3.03084361407e+43 math.exp(100.72) 5.52255713025e+43
log(x)	It returns natural logarithm of x, for x > 0,where x is a numeric expression.	math.log(100.12) 4.60636946656 math.log(100.72) 4.61234438974
log10(x)	It returns base-10logarithm of x for x > 0,where x is a numeric expression.	math.log10(100.12) 2.00052084094 math.log10(100.72) 2.0031157171
pow(x, y)	It returns the value of xy, where x and yare numeric expressions.	math.pow(100, 2) 10000.0 math.pow(100, -2) 0.0001 math.pow(2, 4) 16.0 math.pow(3, 0) 1.0
sqrt (x)	It returns the square root of x for x > 0,where x is a numeric expression.	math.sqrt(100) 10.0 math.sqrt(7)- 2.6457513110645907

cos (x)	It returns the cosine of x in radians, where x is a numeric expression	math.cos(3) 0.9899924966 math.cos(-3) 0.9899924966 math.cos(0) 1.0 math.cos(math.pi) 1.0
sin (x)	It returns the sine of x, in radians, where x must be a numeric value.	math.sin(3)- 0.14112000806 math.sin(-3) - 0.14112000806 math.sin(0) -0.0
tan (x)	It returns the tangent of x in radians, where x must be a numeric value.	math.tan(3) -0.142546543074 math.tan(-3) 0.142546543074 math.tan(0) - 0.0
degrees (x)	It converts angle x from radians to degrees, where x must be a numeric value.	math.degrees(3) 171.887338539 math.degrees(-3) 171.887338539 math.degrees(0) - 0.0
radians(x)	It converts angle x from degrees to radians, where x must be a numeric value.	math.radians(3) 0.0523598775598 math.radians(-3) 0.0523598775598 math.radians(0) - 0.0

Some functions from random module are:

Name of the function	Description	Example
random ( )	It returns a random float x, such that 0 ≤ x	>>random.random( ) 0.281954791393 >>>random.random( ) 0.309090465205

randint (a, b)	It returns a int x between a& b such that a ≤ x ≤ b	>>> random.randint (1,10)
		5
		>>> random.randint (2,20)
		-1

uniform (a,b)	It returns a floating point number x, such that a <= x < b	>>>random.uniform (5, 10) 5.52615217015
randrange([start,] stop[,step])	It returns a random item from the given range	>>>random.randrange(100,1000,3) 150

Some functions from statistics module are:

Name of the function	Description	Example
mean(x)	It returns arithmetic mean	>>>statistics.mean([11,24,32,45,51]) 32.6
median(x)	It returns median (middle value) of x	>>>statistics.median([11,24,32,45,51]) 32
mode(x)	It returns mode (the most repeated value)	>>>statistics.mode([11,24,11,45,11]) 11 >>>statistics.mode(("red","blue","red")) red

Some of the other modules, which you can explore, are: string, time, date.

c) **User defined functions**

    a. The keyword def is used to define a function.
    b. After the keyword comes an identifier i.e. name of the function, followed by parenthesized listof parameters and the colon which ends up the line.
    c. Next follows the block of statement(s) that are the part of function.

Creating User Defined Function

Syntax to define a user defined function:

def <function_name> ([parameters]): # def is a keyword
   statement1 # parameters are optional
   statement2 # function name is an identifier
   ----
   return <value> # here return is a keyword

Example:

```
def area_of_circle( radius ):
    print("Area of circle = ", 3.1416*radius*radius)
r=int(input("Enter radius of circle"))
area_of_circle(r)
```

output:

Enter radius of circle 10
Area of circle = 314.16

Points about User Defined Functions:

- Every User Defined Function start with the Keyword def.
- The first line of the function is called Function Definition.
- Function name must follow norms of valid identifier.
- Every function header end with parenthesis and colon sign followed by function name
- We can provide parameters inside parenthesis, which is optional.
- The return statement is used to return a value from function. The return statement is also optional. The function should return a value only at the place from where it gets called.
- To use a function, it must be called or invoked in main program.

Type of user defined functions:

The user defined functions can be categorized in following 4 categories:
- Function which accepts arguments and return some value
- Function which accepts arguments but return no value
- Functions which do not accept any argument but return some value
- Functions which do not accept any argument and even not return any value

Parameters/Arguments passed to functions:

These are the values passed to user defined functions from the calling function. If you are passing values of immutable types (i.e., numbers, strings, etc) to the Called function, then the called function cannot alter their values.

- If you are passing values of mutable types (i.e., List, Dictionary, etc.) to the Called function, then the called function can make changes to them.

They are categorized in following two types:

Formal Parameters or Formal Arguments: These are the values provided in Parenthesis when we write a function Header.Actual Parameters or Actual Arguments: These are the values passed to the function when it is called/invoked.

Example:

def area_of_circle(radius): # here radius is the Formal Parameter or Formal Argument
    print("Area of circle = ",3.1416*radius*radius)
    r=int(input("Enter radius of circle"))
ar=area_of_circle(r) # here r is the Actual Parameter or Actual Argument output:

OUTPUT
Enter radius of circle 10
Area of circle = 314.16

Types of Arguments:

In Python following four types of arguments allowed:

- Positional Arguments
- Default Arguments
- Keyword Arguments
- Variable length Arguments

(i) Default Parameters

The parameters which are assigned with a value in function header while defining the function are known as default parameters. This value is optional for the parameter. If a user explicitly passes the value in function call, then the value which is passed by the user will be taken by the default parameter. If no value is provided, then the default value will be taken by the parameter. **Default parameters will be written in the end of the function header, means positional parameter cannot appear to the right side of default parameter.**
Example:

def SICal(amount, rate, time=10):   #Function definition header

(ii) Required Arguments /Positional Parameters

When the function call statement must match the number and positional order of arguments as defined in the function definition, this is called the positional parameters.

Example:

def Test(x,y,z): #function definition header

Then we can call function using following statements p,q,r=3,4,6

Test(p,q,r)   #3 variables are passed

Test(4,q,r)   # 1 literal and 2 variables are passed

Test(5,6,7)   # 3 literals are passed.

So x,y,z are positional parameters and the value must be provided to these parameters

(iii) Keyword arguments:

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. This allows you to place argument out of order because the Python interpreter is able to use the keywords provided to match the values with parameters. Having a positional argument after keyword arguments will result into error

Example

```
def show(x,y):
    print("Name is ",x)
    print("Age is ",y)
show(y=18,x="Raj")
```

OUTPUT

Name is Raj

Age is 18

(iv) Variable Number of Arguments:

In cases where you don't know the exact number of arguments that you want to pass to a function, you can use the following syntax with *args: The variable stored in *args are represented in the form of tuple.

Example

```
def change(*a):
    for i in a:
      print(i)
    print(a)
change(10,5)
change(15,20,25)
```

OUTPUT

10

5

(10, 5)

15

20

25

(15, 20, 25)

What is the difference between parameter and argument?

Ans. Parameters are temporary variable names within functions. The argument can be thought of as the value that is assigned to that temporary variable. For instance, let's consider the following simple function to calculate sum of two numbers.

```
def sum(a,b):
    return a+b
sum(10,20)
```

Here a, b are the parameters for the function 'sum'.

Arguments are used in procedure calls, i.e., the values passed to the function at run-time.10,20 are the arguments for the function sum

Function returning value(s)

A function can return multiple values. The return values should be a comma-separated list of values. The multiple return values are returned as a tuple. We can unpack the received value by specifying the same number of variables on the left side of the function call.

Example 1:
```
def add10(x,y,z):
    return x+10,y+10,z+10
x=10
y=20
z=30
result=add10(x,y,z)
print(result)
```

Output
(20, 30, 40)
Example 2:

```
def add10(x,y,z):
    return x+10,y+10,z+10
x=10
y=20
z=30
a,b,c=add10(x,y,z) #unpack
```

Output:
20 30 40

SCOPE OF VARIABLES:

Scope of a variable is the portion of a program where the variable is recognized and can be accessed therein.

There are two types of scope for variables:

- Local Scope
- Global Scope

1.Local Scope:

A variable declared in a function-body is said to have local scope. It cannot be accessed outside the function. In this scope, the lifetime of variables inside a function is as long as the function executes.

2. Global Scope:

A variable declared in top level segment (main) of a program is said to have a global scope.

In this scope, lifetime of a variable inside a program is as long as the program executes.

Example 1:

```
def Sum(x , y) :
    z = x + y
    return z
a = 5
b = 7
s = Sum(a , b)
print(s)
```

In the above program x, y and z are local variables and are destroyed once we return from the function. a, b and s are global variables and remains in the memory until the program executes.

Example 2:

```
def my_func( ):
    x=10    # local variable print("Value inside function:",x)
x=20        # global variable my_func( )
print("Value outside function:",x)
```

Output:

Value inside function:10

Value outside function:20

Here, we can see that the value of x is 20 initially. Even though the function my_func() changed the value of x to 10, it did not affect the value outside the function. This is because the variable x inside the function is different (local to the function) from the one outside. Although they have same names, they are two different variables with different scope. On the other hand, variables outside of the function are visible from inside. They have a global scope.

Practice Questions

1	Which of the following is a valid function name? a) Start_game() b) start game() c) start-game() d) All of the above
2	If the return statement is not used in the function then which type of value will be returned by the function? a)int b) str c) float d) None
3	Richa is working with a program where she gave some values to the function. She doesn't know the term to relate these values. Help her by selecting the correct option. a) function value b) arguments or parameters c) return values d) function call

4	What is the minimum and maximum value of c in the following code snippet?
	import random
	        a=random.randint(3,5)
	        b = random.randint(2,3)
	        c = a + b
	        print(c)
	
	a) 3 , 5 b) 5, 8 c) 2, 3 d) 3, 3

5	In python function, the function calling another function is known as _____and the function being called is known _____ a) main, keyword b) caller, called c) called, caller d) executer, execute
6	What will be the output of the following code? print("100+200") a) 300 b) 100200 c) 100+200 d) 200
7	pow( ) function belongs to which library ? a) math b) string c) random d) maths
8	What data type is the object below? L = (1, 23, 'hello',1) a) list b) dictionary c) array d) tuple
9	What is returned by int(math.pow(3, 2))? a) 6 b) 9 c) error, third argument required d) error, too many arguments
10	Which of the following is not a type conversion functions?

	a) int() b) str() c) input() d) float()
11	Write the output of the following: print(float())
12	Identify the module to which the following function load ( ) belong to? a) math b) random c) pickle d) sys
13	How many argument(s) a function can receive a) Only one b) 0 or many c) Only more than one d) At least one

14	Give the output
	
	``
	   def fun():
	            global a
	            a=10
	            print(a)
	      a=5
	      fun()
	      print(a)
	``
	a) 10 b) 5 c) 5 d) 10
	     10 10 5 5

15	Value returning functions should be generally called from inside of an expression a) True b) False
16	The variable declared inside the function is called a_____variable a) global b) local c) external d) none of the above
17	These are predefined functions that are always available for use. For using them we don't need to import any module a) built in function b) pre-defined function c) user defined function d) none of the above
18	The_____of a variable is the area of the program where it may be referenced a) external b) global c) scope d) local
19	If you want to communicate between functions i.e. calling and called statement, then you should use _____ a) values b) return c) arguments d) none of the above

20	Which of the following function header is correct?
	a) def mul(a=2, b=5,c) b) def mul(a=2, b, c=5)
	c) def mul(a, b=2, c=5) d) def mul(a=2, b, c=5)
21	Find the flow of execution of the following code:
	1. def calculate (a, b): 2. res=a**b 3. return res 4. 5. def study(a): 6. ans=calculate(a,b) 7. return ans 8. 9. n=2 10. a=study(n) 11. print(a)
	a) 1 > 5 > 9 > 10 >6 > 2 > 3 > 7 > 11 b) 5 > 9 > 10 > 6 > 2 > 3 > 7 > 11
	c) 9 > 10 > 5 > 1 > 6 > 2 > 3 > 7 > 11 d) None of the above
22.	Python resolves the scope of a name using the LEGB rule
	a) True b) False
23	A void function internally returns legal empty value _____
	a) None b) Close() c) Return d) all
24	When you use multiple type argument in function, then default argument take place _____
	a) at beginning b) at end c) anywhere d) none of the above
25	A_____can be skipped in the function call statements
	a) named parameter b) default parameter
	c) keyword parameters d) all of the above

	ANSWERS
1	a)Start_game()
2	d) None
3	b) arguments or parameters
4	b) 5, 8
5	b) caller, called
6	c) 100+200
7	a) math
8	d) tuple
9	b) 9
10	c) input()
11	b) 0.0
12	c)pickle
13	b) 0 or many
14	a) 10 10
15	a) True
16	b) local
17	a) built in function
18	c) scope
19	c) arguments
20	c) def mul(a, b=2, c=5)
21	a) 1 > 5 > 9 > 10 >6 > 2 > 3 > 7 > 11
22	a) True
23	a) None
24	b) at end
25	b) default parameter

	QUESTIONS

1.	What is the output of the following code?
	
	``python
	def cube(x):
	    return x * x * x
	x = cube(3)
	print(x)
	``
	a) 9 b)3 c)27 d) 30
	Ans. C)
	27

2	Which of the following items are present in the function header? a) function name b) parameter list c) return value d) Both A and B Ans.d Both A and B

3	Choose correct answer
	
	``python
	def fun1(num):
	    return num+5
	print(fun1(5))
	print(num)
	``
	a) Print value 10 b) Print value 5 c) Name Error d) 25
	Ans c)Name Error

4.	Predict the output of the following code
	
	``python
	def func1(list1):
	    for x in list1:
	        print(x.lower(),end="#")
	func1(["New","Dehli"])
	``
	A. [New,Dehli]
	B. new#dehli#
	C. newdehli#
	D. New#Dehli#
	Ans. B)new#dehli#

5.	What will be the output of the following python code?
	
	``python
	def mul (num1, num2):
	    x = num1 * num2
	x = mul(20,30)
	``
	A. 600 B. None C. No Output D. 0
	Ans. C)No Output

6	Which of the following function header is Correct: A. def fun(x=1,y) B. def fun(x=1,y,z=2) C. def fun(x=1,y=1,z=2) D. def fun(x=1,y=1,z=2,w) Ans.c) def fun(x=1,y=1,z=2)
7	What is the output of the program given below? x = 50 def func (x) : x = 2 func (x) print ('x is now', x) A) x is now 50 B) x is now 2 C) x is now 100 D) Error Ans. A) A) x is now 50

8	Choose the correct output from the options given below.
	print('Welcome!')
	print('Iam',__name__) # is double underscore
	a) Welcome! b) Error
	   Iam __main__
	c) Welcome! d)None of these
	   Iam __name__
	Ans. a)Welcome!
	Iam __main__

9	Predict the output of the following code fragment
	def update(x=10):
	  x+=15
	  print("x=",x)
	x=20
	update()
	print("x=",x)
	a) x=20 b) x=25
	    x=25 x=25
	c) x=20 d) x=25
	 x=25 x=20
	Ans. d)
	x=25
	x=20

10	Predict the output of the following code fragment
	``python
def display(x=2,y=3):
    x=x+y
    y+=2
    print(x,y)
display( )
display(5,1)
display(9)
```
a) 5 5                b)12 5<br>  6 3                    6 3<br>  12 5                 5 5<br><br>c) 5 6                 d) 5  5<br>  12 5                 7  7<br>  6 3                  6  6<br>Ans. a)<br>5 5<br>6 3<br>12 5 |
| 11 | Find the output print(pow(5,4,9))<br>a)    7     b)0    c)4    d) error<br>Ans.  C) 4<br>Hint: pow(x, y, z) is equal to $x^y$ % z |
| 12 | Give the output of the following program<br>```python
def check(a):
        for i in range(len(a)):
                a[i]=a[i]+5
                return a
b=[1,2,3,4]
c=check(b)
print(c)
```<br>a)  [6, 8, 8, 9]         b) [6,7,8,9]<br>c)  [7, 7, 8, 9]         d) [6,7,9,9]<br>Ans.  b)    [6, 7, 8, 9] |
| 13 | Give the output<br>```python
def abc(x,y=60):
    return x+y
a=20
``` |

```
b=30
a=abc(a,b)
print(a,b)
b=abc(a)
print(a,b)
a=abc(b)
print(a,b)
```

a) 50 30 50 110 170   b) 30 50 110 170 110

c) 50 30   d) 50 30 50 110 170 110

    50 110

  170 110

Ans.C)

c) 50 30

   50 110

  170 110

---

14 Predict the output of the following code snippet:

```
def Execute(M):
  if M%3==0:
    return M*3
  else:
    return M+10;
def Output(B=2):
  for T in range (0,B):
    print(Execute(T),"*",end="")
  print()
Output(4)
Output()
Output(3)
```

Ans.

```
0 *11 *12 *9 *
0 *11 *
0 *11 *12 *
```

15.	Find the output of the following program:
	``python
def ChangeIt(Text,C):
    T=""
    for K in range(len(Text)):
        if Text[K]>='F' and Text[K]<='L':
            T=T+Text[K].lower();
        elif Text[K]=='E' or Text[K]=='e':
            T=T+C;
        elif K%2==0:
            T=T+Text[K].upper()
        else:
            T=T+T[K-1]
    print(T)
OldText="pOwERALone"
ChangeIt(OldText,"%")
```
(a) PPW%RRLLN%    (b) PPWCRRllNC

(c) PPW%RRllN%    (d) PpW%RrllN%

Ans: c)

PPW%RRllN% |
| 16 | What possible outputs are expected to be displayed on screen at the time of execution of the program from the following code? Also specify the maximum value that can be assigned to each of the variables L and U.

```python
import random
Arr=[10,30,40,50,70,90,100]
L=random.randrange(1,3)
U=random.randrange(3,6)
for i in range(L,U+1):
    print(Arr[i],"@",end="")
``` |

	i) 40 @50 @ ii) 10 @50 @70 @90 @
	iii) 40 @50 @70 @90 @ iv) 40 @100 @
	Ans. Options i and iii
	i)40 @50 @
	iii) 40 @50 @70 @90 @
	Maximum value of L and U
	L=2 ,U=5

17	Find the output of the following code
	
	``python
	def disp(str):
	    m=' '
	    for i in range(0,len(str)):
	        if(str[i].isupper()):
	            m=m+str[i].lower()
	        elif str[i].islower():
	            m=m+str[i].upper()
	        else:
	            if i%2==0:
	                m=m+str[i-1]
	            else:
	                m=m+"@"
	    print(m.swapcase())
	disp('StudyBag$2021')
	``
	
	a) StudyBagG@2@2 b) sTUDYbAGg@2@2 c) StudyBagG$2$2 d) None
	    Ans : a)
	    StudyBagG@2@2
	
	Note: The swapcase() method returns a string where all the upper case letters are lower case and vice versa. Syntax. string.swapcase().

18	What will be the output of the following code
	
	``python
	total=0
	def add(a,b):
	        global total
	        total=a+b
	        print(total)
	add(6,6)
	print(total)
	``

	a) 12 b) 12 c) 0 d) None of these 12 0 12 Ans : a) 12 12

19	Find and write the output of the following Python code:
	
	``python
	def makenew(mystr):
	    newstr = " "
	    count = 0
	    for i in mystr:
	        if count%2 ==0:
	            newstr = newstr+i.lower()
	        else:
	            if i.islower():
	                newstr = newstr+i.upper()
	            else:
	                newstr = newstr+i
	        count +=1
	    newstr = newstr+mystr[:3]
	    print ("The new string is :", newstr)
	makenew("cbseEXAMs@2022")
	``
	
	Ans. The new string is :
	     cBsEeXaMs@2022cbs

20	What possible output(s) are expected to be displayed on screen at the time of execution of the following code? Also specify the maximum and minimum value that can be assigned to variable X.
	
	``python
	import random
	L=[10,7,21]
	X=random.randint(1,2)
	for i in range(X):
	    Y=random.randint(1,X)
	print(L[Y],"$",end=" ")
	``
	
	(i)10 $ 7 $ (ii) 21 $ 7 $ (iii) 21 $ 10 $ (iv) 7 $
	Ans. iv) 7 $
	Maximum value of x is 2
	
	Minimum value of x is 1

21	Choose the correct option:
	Statement1: Local Variables are accessible only within a function or block in which it is declared.
	Statement2: Global variables are accessible in the whole program.

	a. Statement1 is correct but Statement2 is incorrect
	    b. Statement2 is correct but Statement1 is incorrect
	    c. Both Statements are Correct
	    d. Both Statements are incorrect

	Ans.c) Both Statements are Correct
22	Consider the following code and choose correct answer:

	``
	def nameage(name, age):
	    return [age,name]
	t=nameage('kishan',20)
	
	print(type(t))
	``

	a) tuple b) list c) (kishan,20) d) None of all
	Ans : b)
23	Write the output of the following:
	``` a=(10, 12, 13, 12, 13, 14, 15) print(max(a) + min(a) + a.count(2)) ```
	a) 13 b) 25 c) 26 d) Error
	Ans : b) 25
24	Consider the code given below and Identify how many times the message "**Hello All**" will be printed.

	``
	def prog(name):
	  for x in name:
	    if x.isalpha():
	      print('Alphabet')
	    elif x.isdigit():
	      print('Digit')
	    elif x.isupper():
	      print('Capital Letter')
	    else:
	      print('Hello All')
	prog('vishal123@gmail.com')
	``

	a) 0 b) 2 c) 1 d) 3
	Ans: b) 2
25	Find and write the output of the following Python code:
| | ```
def changer(p,q=10):
    p=p/q
    q=p%q
    print(p,"#",q)
    return p
a=200
b=20
a=changer(a,b)
print(a,"$",b)
a=changer(a)
print(a,"$",b)
``` |
	Ans.
	10.0 # 10.0
	10.0 $ 20
	1.0 # 1.0
	1.0 $ 20
26	What will be the output for the below code snippet?
| | ```
def div(lst,n):
    for i in range(0,n):
        if lst[i]%5==0:
            lst[i]+=5
        else:
            lst[i]=lst[i]//2
lt=[45,20,23,54,5]
div(lt, len(lt))
for i in lt:
    print(i,end='#')
``` |
	a) 50#25#11.5#27.0#10# b) 50#25#11#27#10#
	c) 50#25#1#0#10# d) 225#100#1#0#25#
	Ans: b) 50#25#11#27#10#

DATA FILE HANDLING

File- A file is a sequence of bytes on the disk/permanent storage where a group of related data is stored. File handling in Python enables us to create, update, read, and delete the files stored on the file system through our python program.

Data File handling takes place in the following order.

1- Opening a file.
2- Performing operations (read, write) or processing data.
3- Closing the file.

Types of File in Python:
Python allows us to create and manage three types of data files.

1- Text file
2-   Binary file
3-   CSV file

Text file: A text file is simply a sequence of ASCII or Unicode characters. A line is a sequence of characters, stored on permanent storage. In a text file, each line is terminated by a special character, known as End of Line (EOL). Text file can be created using any text editor. Ex. Myfile.txt.

Binary file: A binary file stores the data in the same way as stored in the memory. The .exe files,mp3 file, image files, word documents are some of the examples of binary files. We can't read abinary file using a text editor.

CSV file: CSV (Comma Separated Values) is a simple text file format for storing data in tabular form such as spread sheet or database. The data is organized with one record on each line and each field is separated by comma.

Compare text files, binary files and csv files

Sl.no	Text file	Binary file	CSV file
1	It is capable to handle textual data.	It is capable to handle large file.	It is very common format and platform independent.
2	It consists of series of lines of a set of letters, numbers or symbols (String)	It consists of data with a specific pattern without any delimiter.	It consists of plain text with a list of data with a delimiter.

3	Any text editors like notepad can be used to read them.	No specific programs can be used to read them, python provides functions to read data.	It can be read using text editors like notepads and spreadsheet software.
4	Every line ends with EOL.	There is no specific EOL character.	It terminates a lineautomatically when the delimiter is not used after data.

Absolute Path – It is a full path of the file from the root directory. Absolute paths ensure that Python can find the exact file on your computer.

Ex : - C:\\Users\\Tanmay\\Desktop\\Delete\\file_handling.txt

f=open("C:\\Users\\Tanmay\\Desktop\\Delete\\file_handling.txt",r)

Relative Path – It is the path of the file from the current working directory.

Relative Path is the hierarchical path that locates a file or folder on a file system starting from thecurrent directory. The relative path is different from the absolute path, which locates the file or folder starting from the root of the file system.

f=open("file_handling.txt",r)

Operation On Files

In Python

1. Opening a file   – open() function
2.Read/Write file
–   Read Functions – read() , readline(), readlines()
–   Write Functions – write() , writelines()
3.Close the File   – close() Function

4.Remove the file   – remove() #Function of OS Module
5.Rename the file   –rename("oldname","newname") #Function of OS Module

  Read the Contents of An Existing
   File
  1. Open the file–
          file_object = open("read_sample.txt", 'r') # Relative Path
          file_object = open("C:\\Desktop\\Notes\\sample.txt") #Absolute Path

  2. Reading the file–
          rf = file_object.read()

print(rf)

3. Closing the file–

file_object.close()

Working of open() function

We use open () function in Python to open a file in read or write mode. open ( ) will return a fileobject. To return a file object we use open() function along with two arguments, that accepts file name and the mode, whether to read or write. So, the syntax being: open(filename, mode). Thereare three kinds of mode, that Python provides and how files can be opened:
" r ", for reading.
" w ", for writing.
" a ", for appending.

Modes Description

1.   **r**   -   Opens a file for reading only. The file pointer is placed at the beginning ofthe file. This is the default mode. Gives error if file does not exist.

2.   **r+**   -   Opens a file for both reading and writing. The file pointer placed at thebeginning of the file.

3.   **w**   -   Opens a file for writing only. Overwrites the file if the file exists. If the filedoes not exist, creates a new file for writing.

4.   **w+**   -   Opens a file for both writing and reading. Overwrites the existing file if thefile exists. If the file does not exist, creates a new file for reading and writing.

5.   **a**   -   Opens a file for appending. The file pointer is at the end of the file if the file exists. That is, the file is in the append mode. If the file does not exist, it creates a newfile for writing.

6.   **a+**   -   Opens a file for both appending and reading. The file pointer is at the endof the file if the file exists. The file opens in the append mode. If the file does not exist, itcreates a new file for reading and writing.

Reading from a file

There are three ways to read data from a text file.

read() : Returns the read bytes in form of a <u>string</u>. Reads n bytes, if no n specified, reads the entire file.

> File_object.read([n])

readline() : Reads a line of the file and returns in form of a <u>string</u>. For specified n, reads at most n bytes. However, does not reads more than one line, even if n exceeds the length of the line.

> File_object.readline([n])

readlines() : Reads all the lines and return them <u>list</u> in which each line as a string element.

> File_object.readlines()

Note: '\n' is treated as a special character of two bytes.

Writing onto text files:

write() function

The write() function will write the content in the file without adding any extra characters.

> file_name.write(content)

writelines() function
This function writes the content of a list to a file.file_name.

> writelines(list_of_lines)

 # Program to show various ways to read data from a file.

 # Creating a file
```
file1 = open("myfile.txt", "w")
L = ["This is Delhi \n", "This is Paris \n", "This is London \n"]
```

 # Writing data to a file
```
file1.write("Hello \n")
file1.writelines(L)
```

```python
file1.close()

 # to change file access modesfile1 = open("myfile.txt", "r+")

print("Output of Read function is ")
print(file1.read())
print()

# seek(n) takes the file handle to the nth
# byte from the beginning.
file1.seek(0)

print("Output of Readline function is ")
print(file1.readline())
print()

file1.seek(0)

# To show difference between read and readline
print("Output of Read(9) function is ")
print(file1.read(9))
print()

file1.seek(0)

print("Output of Readline(9) function is ")
print(file1.readline(9))
print() file1.seek(0)
```

Output:

```
Output of Read function is
Hello
This is Delhi
This is Paris
This is London

Output of Readline function is

Hello

Output of Read(9) function is
Hello
Th

Output of Readline(9)
function is
Hello
```

Output of Readlines function is

['Hello \n', 'This is Delhi \n', 'This is Paris \n', 'This is London \n']

Setting Offsets in a File

If we want to access data in a random fashion, then Python gives us seek() and tell() functionsto do so

The tell() method

This function returns an integer that specifies the current position of the file object in the file. The position so specified is the byte position from the beginning of the file till the current position of the file object. The syntax of using tell() is:

A=file_object.tell()

The seek() method

This method is used to position the file object at a particular position in a file. The syntax of seek() is:

file_object.seek(offset [, reference_point])

In the above syntax, offset is the number of bytes by which the file object is to be moved. reference_point indicates the starting position of the file object. That is, with reference to which position, the offset has to be counted. It can have any of the following values:

0   - beginning of the file
1   - current position of the file
2   - end of file

By default, the value of reference_point is 0, i.e. the offset is counted from the beginning of the file.

For example, the statement fileObject.seek(5,0) will position the file object at 5th byte position from the beginning of the file.

SAMPLE PROGRAMS

1.   Write a program to write roll no and name to xiib.txt

```
f=open("xiib.txt","w")
while (input("enter ur choice")=='y'):
  a=int(input("enter roll no"))
  n=input("enter name")
  f.write(str(a))
  f.write(n)
  f.write('\n')
f.close()
```

   2.Write read contents from story.txt and count no: of independent words
"to" in the file

```
f=open("story.txt","r")
s=f.read()
l=s.split()
c=0
for i in s:
   if i=="to":
      c+=1
f.close()
print(c)
```

   3._____ is the return type of readline()

     Ans: string

PRACTICE QUESTIONS

1.   Write a program to read contents from the text file story.txt and count no:of vowels in it

2.   Write a program to read contents from the text file myfile.txt and find average word count

3.   Write a program to read contents from the text file library.txt and count "is" as independent word

4.   Write a program to read contents from the text file diary.txt and count number of lines with Starting letter "T" or "M"

5.   Write a program to read contents from the text file mydiary.txt and count number of lines with ending letter "r"

MULTIPLE CHOICE QUESTIONS

1.   If a text file is opened in **w+** mode, then what is the initial position of file pointer/cursor?
a.   Beginning of file
b.   End of the file
c.   Beginning of the last line of text file
d.   Undetermined

2.   Which of the following statements are true?
a.   When you open a file for reading, if the file does not exist, an error occurs
b.   When you open a file for writing, if the file does not exist, a new file is created
c.   When you open a file for writing, if the file exists, the existing file is overwritten with the new file
d.   All of the mentioned

3.   To read the entire remaining contents of the file as a string from a file object myfile, we use
a.   myfile.read(2)
b.   myfile.read()
c.   myfile.readline()
d.   myfile.readlines()

4.   A text file is opened using the statement **f = open('story.txt').** The file has a total of 10 lines. Which of the following options will be true if statement 1 and statement 2 are executed in order.
Statement 1: L1 = f.readline( )

Statement 2: L2 = f.readlines( )

a.   L1 will be a list with one element and L2 will be list with 9 elements.
b.   L1 will be a string and L2 will be a list with 10 elements.
c.   L1 will be a string and L2 will be a list with 9 elements.
d.   L1 will be a list with 10 elements and L2 will be an empty list.

5.   Which function of a file object can be used to fetch the current cursor position in terms of number of bytes from beginning of file?
a.   seek( )
b.   bytes( )
c.   tell( )
d.   fetch( )

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

```
f = open('test.txt', 'w+')

L = ['First Line\n', 'Second Line\n', 'Third Line']

f.writelines(L)
f.flush()
f.seek(0)
O = f.readlines()
print(len(O))
```

a. 33
b. 31
c. 28
d. 3

7. The contents of a text file named 'quote.txt' is as shown below:

> All the kings horses and all the kings men
>
> cannot fix what isn't broken.

What will be the output of the following code?

```
fin = open('fracture.txt')
data = fin.read(10)
print(data[0:3], end= '')
data = fin.readline(5)
print(data[0:3] , end= '')
fin.seek(0)
data = fin.read(4)
print(data[0:3] , end= '')
```

a. AllngsAll
b. AllcanAll
c. Allcancan
d. Allngscan

8. What will be the most correct option for possible output of the following code, given that the code executes without any error.

```
f = open('cricket.txt')
data = f.read(150)
print(len(data))
```

a. It will always be 150

b.   151
c.   More than or equal to 150
d.   Less than or equal to 150

9.   For the following python code, what will be the datatype of variables x, y, z given that the code runs without any error?

```
f = open('story.txt')
x = f.read(1)
y = f.readline()
z = f.readlines()
```

a.   string, list, list
b.   None, list, list
c.   string, string, list
d.   string, string, string

10.   The contents of a text file named 'fracture.txt' is as shown below:

Do you dare stay out, Do you dare go in
How much can you lose, How much can you win
And if you go in, should you turn left or right
You will get so confused that you will start in to race

What will be the output of the following code?

```
fin = open('fracture.txt')
x = 0
for line in fin:
    words = line.split( )
    for w in words:
        if len(w)>x:
            x = len(w)
print(x)
```

a.   12
b.   11
c.   13
d.   10

Answers:
1.   a. Beginning of file
2.   d. All of the mentioned
3.   b. myfile.read()
4.   c. L1 will be a string and L2 will be a list with 9 elements.
5.   c. tell( )

6.   d. 3
7.   a. AllngsAll
8.   d. Less than or equal to 150
9.   c. string, string, list
10.   a. 12

VERY SHORT ANSWER TYPE QUESTIONS

1.   **Differentiate between file modes r+ and w+ with respect to python?**

Ans: r+ opens a text file for reading and writing.

w+ opens a text file for reading and writing. It overwrites the file if it exists, create a file

if it doesn't.

2.   **Write a statement in Python to open a text file "ABC.TXT" in reading mode.**

Ans: F=open("ABC.TXT","r")

3.   **In _____ files each line terminates with EOL or '\n' or carriage return, or**

'\r\n'.

Ans: Text File

4.   **Observe the following code and answer the questions that follow.**

File=open("MyData","a")

_____ #Blank1

File.close()

a)   What type (text/binary) of file is MyData ?

b)   Fill the Blank1 with statement to write "ABC" in the file "Mydata"

Ans: a) Text File

    b) File.write("ABC")

5. **What are files?**

    Ans: A named entity, usually stored on a hard drive that contains a stream of
characters are called files.

2 SHORT ANSWER TYPE QUESTIONS

1.   **Explain seek() method in python.**

In Python, seek() function is used to change the position of the File Handle to a given

specific position.

        Syntax: fi.seek(offset, from_where), where fi is the file pointer

Offset: This is used for defining the number of positions to move forward.

from_where: This is used for defining the point of reference. It can take

0: beginning of the file. **1:** current position of the file. **2:** end of the file.

2.   **Write a function in Python that counts the number of "the" or "this" words present in a text file "myfile.txt".**

   Example: If the "myfile.txt" contents are as follows:
   This is my first class on Computer Science. File handling is the easiest topic for me and Computer Networking is the most interesting one.

The output of the function should be: Count of the/this in file: 3

Answer:
```
def displayTheThis():
  num=0
  f=open("myfile.txt","r")
  N=f.read()
  M=N.split()
  for x in M:
    if x=="the" or x== "this":
      print(x)
      num=num+1
  f.close()
  print("Count of the/this in file:",num)
```

3.   **Write a function countVowels() in Python, which should read each character of a text file "myfile.txt", count the number of vowels and display the count.**

   Example: If the "myfile.txt" contents are as follows:
   This is my first class on Computer Science.

The output of the function should be: Count of vowels in file: 10

Answer:
```
def countVowels():
 fobj = open("myfile.txt")
 data = fobj.read()
 count = 0
 vowels=['a','e','I','o','u']
 for ch in data:
  if ch in vowels:
    count +=1
 print("Count of vowels in file:", count)
```

4.   **Write a Python program to count all the line having 'a' as last character**.
Answer:

```
count =0
f=open('fracture.txt',"r")
data=f.readlines()
for line in data:
   if line[-2] == 'a':
      count=count+1
print("Number of lines having 'a' as last character is/are : " ,count)

      f.close()
```

5.   **Assume that a text file named TEXT1.TXT already contains some text written into it, write a program with a function named vowelwords(),that reads the file TEXT1.TXT and create a new file named TEXT2.TXT ,which shall contain only those words from the file TEXT1.TXT which don't start with an uppercase vowel(i.e. with 'A','E','I','O','U')** ,
for example if the file TEXT1.TXT contains
Carry Umbrella and Overcoat When it Rains
then the file TEXT2.TXT shall contain
Carry and when it Rains.

Answer:

```
def vowelwords ():
  file1=open('TEXT1.txt','r')
  file2=open('TEXT2.txt','w')
  text = file1.read()
  text=text.split()
  vowels=['A','E','I','O','U']
  for i in text:
   if i[0] not in vowels:
     file2.write(i)
     file2.write(" ")
  file1.close()
  file2.close()
vowelwords()
```

BINARY FILES

```
┌─────────────────┐     ┌─────────────────┐     ┌─────────────────┐
│   Binary file   │     │      File       │     │  Modules and    │
│                 │     │   Operations    │     │    Methods      │
└────────┬────────┘     └────────┬────────┘     └────────┬────────┘
         │                       │                       │
  ┌──────┴──────┐         ┌──────┴──────┐         ┌──────┴──────┐
  │    Basic    │         │    Read     │         │import pickle│
  │   operatio  │         │ operations in│        │   module    │
  └─────────────┘         │ a binary file│        └─────────────┘
                          └─────────────┘
  ┌─────────────┐         ┌─────────────┐         ┌─────────────┐
  │open using file│       │write/create │         │   dump()    │
  │ openmodes   │         │             │         │   method    │
  │ • rb, rb+   │         └─────────────┘         └─────────────┘
  │ • wb, wb+   │                                 ┌─────────────┐
  │ • ab, ab+   │         ┌─────────────┐         │   load()    │
  └─────────────┘         │   search    │         │   method    │
                          │             │         └─────────────┘
  ┌─────────────┐         └─────────────┘
  │close a binary│        ┌─────────────┐
  └─────────────┘         │   append    │
                          │   update    │
                          │   delete    │
                          └─────────────┘
```
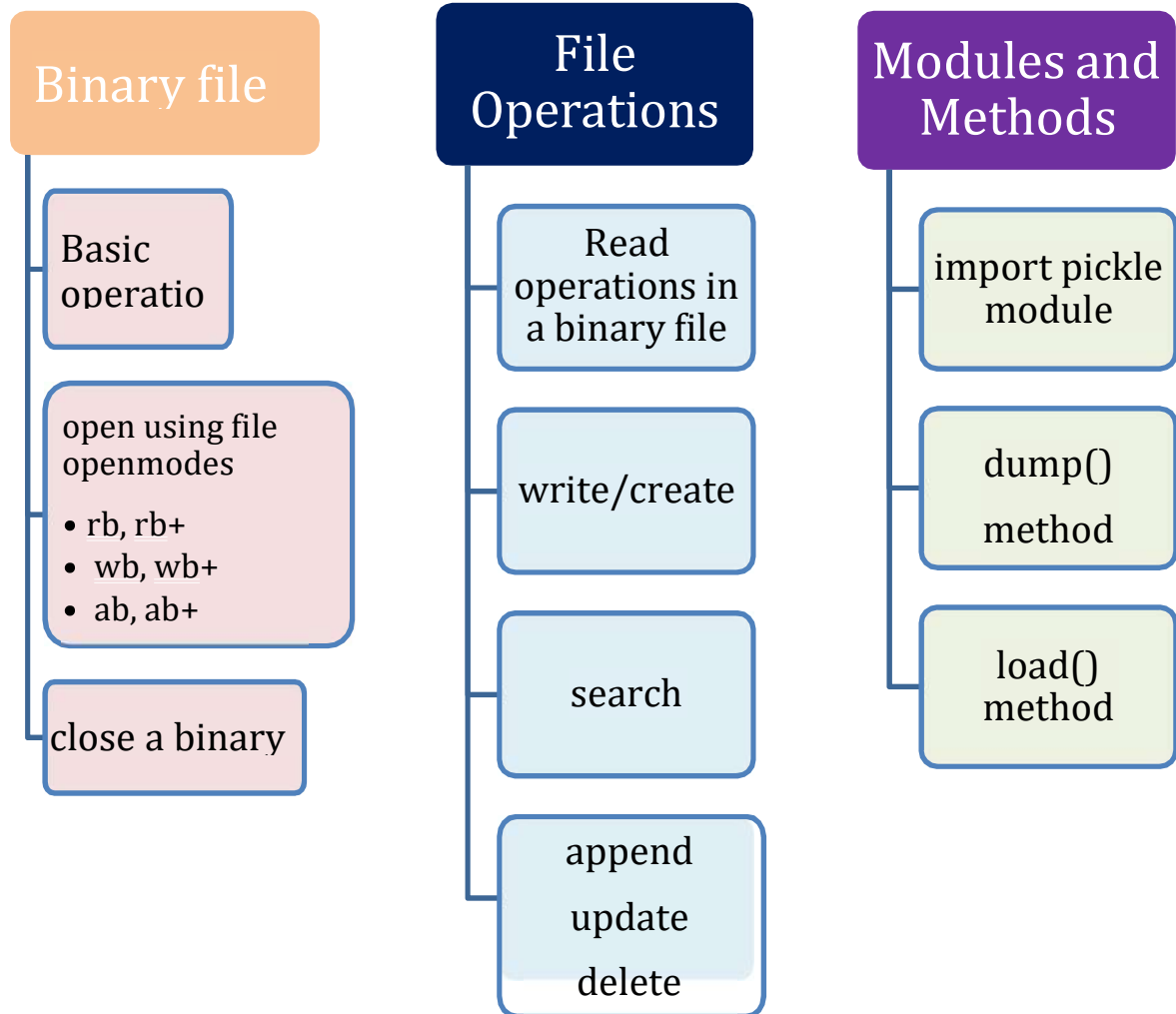
• Binary file(used to store binary data such as images, video files, audio files etc.) is a non-text file. It contains data as 1s and 0s(computer readable format).

• Binary files are processed byte by byte.

• There is no delimiter and EOL character in the binary file.

• There is no translations occur in binary files

• Binary files are faster in processing and consumes less memory compared to text files.

• Extension of binary files are any non-text file exensions like .bin,.dat etc

• pickle module is offering functions(dump and load) to operating binary files.

• File opening mode must attach 'b' to it for operating binary file(Ex: 'rb'-forreading)

Operations on binary file

- Writing data into binary file
- Searching of data
- Modifying data
- Deleting data
- Appending data

try and except block

pickle.load() can generate runtime exceptions like EOFError. *try* and *except* block will handle runtime errors raised due to EOF (end of file) .In *try* block write all the statements that can generate an exception and in *except* block write code to handle the exception.

Writing data into binary file

Write a program to write contents to a binary file stud.dat with record format
        [rollno,name,marks]

```python
import pickle
f=open("stud.dat","wb")
l=[]
while (input("enter ur choice")=='y'):
    r=int(input("enter roll no"))
    n=input("enter name")
    m=int(input("enter marks"))
    l=[r,n,m]
    pickle.dump(l,f)
f.close()
```

Searching of data from binary file

Write a program to read contents from the file stud.dat and display those records whose marks >90. Assume stud.dat existing in the system with the record format   [rollno,name,marks]

```python
import pickle
f=open("stud.dat","rb")
l=[]
try:
    while True:
        l=pickle.load(f)
        if l[2]>90:
            print(l)
except EOFError:
    f.close()
```

Deleting data from a binary file

 Write a program to read contents from the file stud.dat and delete those records whose marks <90. Assume stud.dat existing in the system with the record format
                [rollno,name,marks]
Below program is implemented using function and *module os* is used to use functions like rename() and remove()

```python
import os
import pickle
def delrec():
    f=open("student.dat","rb")
    f1=open("temp.dat","wb")
    l=[]
    try:
        while True:
            l=pickle.load(f)
            if l[2]>90:
                pickle.dump(l,f1)
    except EOFError:
        f.close()
        f1.close()
    os.remove("student.dat")
    os.rename("temp.dat","student.dat")
delrec()
```

Updating /Modifying data in a binary file

Write a program to update records in the file stud.dat with records in the format
  [rollno,name,marks].Increase 10 marks to the student whose rollnumber entered by the user

```python
import pickle
f=open("stud.dat","rb+")
r=int(input("enter roll no"))
l=[]
try:
    while True:
        pos=f.tell()
        l=pickle.load(f)
        if l[0]==n:
            l[2]=l[2]+10
            f.seek(pos,0)
            pickle.dump(l,f)
except EOFError:
    f.close()
```

Appending data in to a binary file

Write a program to append records into the file stud.dat with records in the format
[rollno,name,marks]

```python
import pickle
f=open("stud.dat","ab")
l=[]
while (input("enter ur choice")=='y'):
  r=int(input("enter roll no"))
  n=input("enter name")
  r=int(input("enter marks"))
  l=[r,n,m]
  pickle.dump(l,f)
f.close()
```

Opening a file using with statement

In Python, we can also open a file using with statement.

The syntax of with statement is:

with open (file_name, access_mode) as file_object:

The with statement is a compact statement which combines the opening of file ,
processing of file along with inbuilt exception handling.The with statement will also close
the file automatically after with block is over.

with open("myfile.txt","r+") as myObject:

    content = myObject.read()

Here, we don't have to close the file explicitly using close() statement. Python
will automatically close the file.

SAMPLE QUESTIONS

1. A binary file "employees.dat" has structure [empid, empname, age, department]

   a. Write a user defined function CreateEmployee() to input the data to a record and add to employee.dat
   b. Write a function CountRec(department) in Python which accepts the Department of the employee as the parameter and count and return the number of employees in that department.

```python
import pickle
def createemployee():
    f=open("employee.dat","ab")
    i=int(input("enter id of employee"))
    n=input("enter name of employee")
    age=int(input("enter age of employee"))
    dept=input("enter dept of employee")
    l=[i,n,age,dept]
    pickle.dump(l,f)
    f.close()


def countrec(dept):
    f=open("employee.dat","rb")
    c=0
    l=[]
    try:
        while True:
            l=pickle.load(f)
            if l[3]==dept:
                c+=1
    except EOFError:
        f.close()
    return c
createemployee()
countrec("cs")
```

PRACTICE QUESTIONS

1. A binary file "STUDENT.DAT" has structure [admission_number, Name, Percentage]. Write a function countrec() in Python that would read contents of the file "STUDENT.DAT" and display the details of those students whose percentage is above 75. Also display number of students scoring above 75%.

2.   A binary file "students.dat" has structure (admission_number, Name, Percentage, subject). Write a function countrec() in Python that would read contents of the file and display the details of those students whose subject is "Biology" and percentage is below 45%. Also display the number of such students

3. A binary file "STOCK.DAT" has structure [ITEMID, ITEMNAME, QUANTITY, PRICE].

   (i) Write a user defined function MakeFile( ) to input data for a record and add to Book.dat.

   (ii) Write a function GetPrice(ITEMID) in Python which accepts the ITEMID as parameter and   return PRICE of the Item stored in Binary file STOCK.DAT

4.   A binary file "EMPLOYEE.DAT" has structure (EMPID, EMPNAME, SALARY). Write a function CountRec( ) in Python that would read contents of the file "EMPLOYEE.DAT" and display the details of those Employees whose Salary is above 20000. Also display number of employees having Salary more than 20000.

5. A binary file "Computers.dat" has structure [CNo, Make, Model, Price].

            The description is given below:

        CNo   :   Computer Number   e.g. 278548

        Make   :   Make of PC   e.g. HP

        Model :   Model Number   e.g. VXPC126

        Price   :   Price of computer   e.g.40258.99

    i)Write a user defined function CreatePC() to input data for a record and append in Computers.dat .

   ii.   Write a function FindPCs(Price) in Python which accepts the Price as parameter and display only those computer records from Computers.dat which are having less than or equal to given price.

Multiple Choice Questions

   1. Which of the following statements is true?
      a.   load method of pickle module gives error if EOF is reached
      b.   load method of pickle module returns an empty string is EOF is reached
      c.   load method of pickle module returns -1 if EOF is reached
      d.   None of the above

   2. Shylesh is writing python code to append a new record to a binary file 'salary.dat' that is storing list objects containing [empid, empname, salary]. Consider the following code written by him.

```
import pickle

f = open('salary.dat', 'ab')

id = input("Enter employee id : ")

name = input("Enter name of employee: ")

sal = float(input("Enter salary :"))

record = _____  #Blank 1

pickle.dump(record,f)

f.close()
```

Identify the missing part of Blank 1.

   a.   [id,name,sal]

   b.   id, name, sal

   c.   [empid, empname, salary]

   d.   empid, empname, salary

3. Which is the valid syntax to write an object onto a binary file opened in the write mode?
   a.   pickle.dump(<object to be written>, <file handle of open file>)
   b.   pickle.dump(<file handle of open file>, <object to be written>)
   c.   dump.pickle(<object>, <file handle>)
   d.   None of the above

4. What is the binary file mode associated with " file must exist, otherwise error will be raised and reading and writing can take place".
a.   wb+
b.   w+
c.   rb
d.   rb+

5.   Rahul is trying to write a tuple t = (10,20,30,40,50) on a binary file notebook.bin. Consider the following code written by him.
```
import pickle                    #statement 1
t = (10,20,30,40,50)            #statement 2
myfile = open("notebook.bin",'w')   #statement 3
pickle.dump(t, myfile)          #statement 4
```

myfile.close()

Which of the following statement contains an error?

    a.   Statement 1
    b.   Statement 2
    c.   Statement 3
    d.   Statement 4

6.   A binary file "salary.dat" has structure [employee id, employee name, salary].
What the following code will display:

```
def records():
    num=0
    fobj=open("data.dat","rb")
    try:
        print("Emp id\tEmp Name\tEmp Sal")
        while True:
            rec=pickle.load(fobj)
            if rec[2]< 20000:
                print(rec[0],"\t\t",rec[1],"\t\t",rec[2])
    except:
        fobj.close()
records()
```

    a.   Display the details of those employee whose salary is above 20000.
    b.   Display the details of all the employees.
    c.   Display the salaries of all the employees.
    d.   Display the details of those employees whose salary is less than 20000.

7.   In which file, no delimiters are used for line and no translations occur?
(a) Text file
(b) Binary file
(c) csv file
(d) None of the above

8. Choose the file mode used to write data into binary file.

    (a) rb
    (b) wb
    (c) r+
    (d) w+

9. Which of the following function is used to read data from a binary file?

    (a) write
    (b) load
    (c) dump
    (d) scan

10. Dima is trying to read a list l1 from a binary file 'num'. Consider the following code written by her.

```
import pickle

f1 = open("num",'rb')

l1=_____#Statement 1

print(l1)

f1.close()
```

Identify the missing code in Statement 1.

   (a) pickle.load(f1)

   (b) pickle.load(l1,f1)

   (c) pickle.read(f1)

   (d) pickle.dump(l1,f1)

Answers:

a.load method of pickle module gives error if EOF is reached

a.[id,name,sal]

a. pickle.dump(<object to be written>, <file handle of open file>)

d. rb+

c. Statement 3

d.Display the details of those employees whose salary is less than 20000.

(b) Binary file

(b) wb

(b) load

(a) pickle.load(f1)

CASE STUDY QUESTIONS

Amit Kumar of class 12 is writing a program to store roman numbers and find their equivalents using a dictionary. He has written the following code. As a programmer, help him to successfully execute the given task.

```
import _____                              #Line 1
numericals = {1: 'I', 4 : 'IV', 5: 'V' , 9: 'IX', 10:'X', 40:'XL',50:'L', 90:'XC',
100:'C',400:'CD',500:'D',900:'CM',1000:'M'}


file1 = open("roman.log","_____")            #Line 2
pickle.dump(numerals,file1)
file1.close()
file2 = open("roman.log",'_____")            #Line 3
num = pickle.load(file2)
file2._____                               #Line 4
n = 0
while n!=-1:
    print("Enter 1,4,5,9,10,40,50,90,100,400,500,900,1000:")
    print("or enter -1 to exit")
    n = int(input("Enter numbers"))
    if n!= -1:
        print("Equivalent roman number of this numeral is:",num[n])
    else:
        print("Thank You")
```

(a)   Name the module he should import in Line 1.
(b)   In which mode, Amit should open the file to add data into the file in Line #2
(c)   Fill in the blank in Line 3 to read the data from a binary file.
(d)   Fill in the blank in Line 4 to close the file.
(e)   Write the output he will obtain while input is 100.

Answers:

(a)   pickle
(b)   wb
(c)   rb
(d)   file2.close()
(e)   C

LONG ANSWER QUESTIONS

1. A binary file "emp.dat" has structure [EID, Ename, designation, salary].

I.Write a user defined function CreateEmp() to input data for a record and add to emp.dat.

II.Write a function display() in Python to display the detail of all employees.

Answer:

I.

```python
import pickle
def CreateEmp():
    f1=open("emp.dat",'wb')
    eid=input("Enter E. Id")
    ename=input("Enter Name")
    designation=input("Enter Designation")
    salary=int(input("Enter Salary"))
    l=[eid,ename,designation,salary]
    pickle.dump(l,f1)
    f1.close()
```

II.

```python
import pickle
def display():
    f2=open("emp.dat","rb")
    while True:
        try:
            rec=pickle.load(f2)
            print(rec['eid'],rec['ename'],rec['designation'],rec['salary'])
        except EOFError:
            break
    f2.close()
```

2. A binary file "emp.DAT" has structure [EID, Ename, designation,salary].

I.Write a function to write more items in emp.dat.

II.Write a function Show() in Python that would read detail of employee from file "emp.dat" and

display the details of those employee whose designation is "Manager".

I)

```
import pickle
def createemp():
    f1=open("emp.dat",'ab')
    eid=input("Enter E. Id")
    ename=input("Enter Name")
    designation=input("Enter Designation")
    salary=int(input("Enter Salary"))
    l=[eid,ename,designation,salary]
    pickle.dump(l,f1)
    f1.close()
```

II)
```
def Show():
    f2=open("emp.dat","rb")
    while True:
        try:
            rec=pickle.load(f2)
            if (rec['designation']=='Manager'):
                print(rec['eid'],rec['ename'],
                    rec['designation'],rec['salary'])
        except EOFError:
            break
    f2.close()
```

3.   A binary file "employee.dat" has structure [empId, empName , Dept, Salary].
(i)   Write a user defined function addData() to input data for a record and add tp employee.dat
(ii)   Write a function checkSalary(empName) in Python which accepts the empName as parameter and return the salary of particular employee by the given employee name stored in the file employee.dat
(i)

```
import pickle
def addData():
```

```
                    fobj=open("employee.dat","ab")
                    empID=int(input("Enter Emp ID : "))
                    empName=input("Employee Name :")
                    Dept = input("Department: ")
                    Salary = int(input("Monthly Salary : "))
                    rec=[ empId, empName , Dept, Salary]
                    pickle.dump(rec,fobj)
                    fobj.close()
```

(ii)

```
                import pickle
                def checkSalary(empName):
                 fobj=open("employee.dat","rb")
                 num = 0
                 try:
                   while True:
                     rec=pickle.load(fobj)
                     if Author==rec[3]:
                       num = num + 1
                 except:
                   fobj.close()
                         return num
```

4. A binary file "discovery.dat" has a structure
[scien_name,discovery,yearofDiscovery,yearofbirth]
Write a function display(scien_name) in python that accepts the name of a scientist as
scien_name and returns the discovery with the year of discovery.

```
import pickle
def display(scien_name):
  fobj=open("Discovery.DAT","rb")
  num = 0
  try:
    while True:
    rec=pickle.load(fobj)
    if rec[1] == scien_name:
       print(rec[0],rec[1],rec[2],sep="\t")
       num = num + 1
  except:
    fobj.close()
  return num
```

CSV FILE

- A Comma Separated Values (CSV) file is a plain text file that contains the comma-separated data.
- These files are often used for exchanging data between different applications.
- CSV files are usually created by programs that handle huge amounts of data. They are used to export data from spreadsheets (ex:- excel file) and databases (Ex:- Oracle, MySQL). It can be used to import data into a spreadsheet or a database.

CSV File Structure

sample.csv file structure

Name, DOB, City
Ram, 12-Jul-2001, Delhi
Mohan, 23-Jan-2005, Delhi

Python CSV Module

- CSV Module is available in Python Standard Library.
- The CSV module contains classes that are used to read and write tabular form of data into CSV format.
- To work with CSV Files, programmer have to import CSV Module.

  import csv

Methods of CSV Module :

- writer( )
- reader( )

Both the methods return an Object of writer or reader class. Writer Object again have two methods – writerow( ) , writerows( ).

writer( ) Methods
This function returns a writer object which is used for converting the data given by the user into delimited strings on the file object.

writer( ) Object Methods –
- w_obj . writerow(<Sequence>) : Write a Single Line
- w_obj . writerows (<Nested Sequence>) : Write Multiple Lines

Example:-

writerow()

```
import csv
row=['Nikhil', 'CEO', '2', '9.0']
f=open("myfile.csv", 'w')
w_obj = csv.writer(f)
w_obj.writerow(row)
f.close()
```

writerows()

```
import csv

rows = [['Nikhil','CEO','2','9.0'],

        ['Sanchit','CEO','2','9.1']]

f=open("myfile.csv",'w')

w_obj = csv.writer(f)

w_obj.writerows(rows)

f.close()
```

reader( ) Methods

This function returns a reader object which will be used to iterate over lines of a given CSV file.

```
r_obj = csv.reader(csvfile_obj)
```

To access each row, we have to iterate over this Object.

```
for i in r_obj:
   print(i)
import csv

f=open("myfile.csv",'r')

r_obj = csv.reader(f)

for data in r_obj:

   print(data)

f.close()
```

SAMPLE QUESTIONS:

1. Write a program to read entire data from file data.csv

```
import csv f=open("data.csv", 'r')
d=csv.reader(f)
for row in d:
     print(row)
```

OUTPUT:

```
['Admno', 'Name', 'Class', 'Sec', 'Marks']
['1231', 'Amit', 'XII', 'A', '45']
['1224', 'Anil', 'XII', 'B', '49']
['1765', 'Suman', 'XI', 'A', '42']
['2132', 'Naman', 'XII', 'C', '38']
```

2.Write a program to add/insert records in file "data.csv". Structure of a record is roll number, name and class.

```
import csv
field = ["Roll no" , "Name" , "Class"]
f = open("data.csv" , 'w')
d=csv.writer(f)
d.writerow(field)
rn=int(input("Enter Roll number: "))
nm = input("Enter name: ")
cls = input("Enter Class: ")
rec=[rn,nm,cls]
d.writerow(rec)
f.close()
```

Multiple Choice Questions:

1.   CSV stands for :
a.   Comma Separated Values
b.   Comma Separated Variables
c.   Comma Stored Values
d.   Comma Stored Variables

2.   The separator character of CSV Files is called a
a.   EOL
b.   Delimiter
c.   EOF
d.   Default

3. The default delimiter for a CSV file is :
a. Semi colon
b. Colon
c. Comma
d. Hyphen

4. _____ module of Python provides the functionality to read and write tabular data in CSV file.
a. pickle
b. csv
c. file
d. ccv

5. Which function is used to open a csv file ?
a. Open()
b. csv.open()
c. writer()
d. csv.writer()

6. Name the function to read from CSV file.
a. read()
b. csv.reader()
c. csv.read()
d. readline()

7. Which among the following is not a function of csv module?
a. reader()
b. read()
c. writer()
d. writerows()

8. In Python, default newline character is :
a. \f
b. \t
c. \n
d. \v

9. CSV module allows to write multiple rows using   function.
a. writerows( )

b.   writerow( )

c.   writer( )

d.   None of the above

10.   The opening function of a csv file is similar to the opening of:

a.   Binary file

b.   Text File

c.   Both of them

d.   None of them

11.   The   _____argument of open function is to specify how Python handle the newline characters in csv file

a.   newline

b.   line

c.   mode

d.   char

12.   Which among the following is an iterable object ?

a.   writer

b.   file

c.   reader

d.   All of the above

13.   To specify a different delimiter while writing into a csv file,   argument is used with writer object :

a.   newline

b.   separator

c.   character

d.   delimiter

14.   Which mode opens the file for exclusive creation, which fails in the case where file already exists

a.   a

b.   w

c.   x

d.   r

15.   The file mode to open a CSV file for reading as well as writing is .

a.   a+

b.   w+

c.   r+

d.   All the above.

16.   Identify the line number which may cause an error:

```
import csv      #Line1
line=[[1,2,3],[4,5,6]]#Line 2
with open("sample.csv","w",newline="") as csvfile: #Line3
        writer=csv.writer(csvfile,delimiter="|") #Line4
        for line in writer: #Line5
                writer.writerow(line)
```

a.   Line1

b.   Line2

c.   Line 4

d.   Line

17. The CSV files are files.

a. Plain text file

b. Binary

c. Data

d. Python

18.   The writer() function has how many mandatory parameters?

a.   1

b.   2

c.   3

d.   4

19.   Which of the following parameter needs to be added with open function to avoid blank row followed by each record in the CSV file?

a.   quotechar

b.   quoting

c.   newline

d.   skiprow

20.   Ajaikrishna wants to separate the values by a $ sign. Suggests him a pair of function and parameter to use it.

a.   open, quotechar

b.   writer, quotechar

c.   open, delimiter

d.   writer, delimiter

21. Tejalakshmi of Class 12 have written the below code . Observe and fill in the given blanks so that it opens the file "data.csv" and read and print all the records.

```
import csv
with_____as f: #1
        r = _____(f) #2
        for row in  _____  : #3

                print(_____) #4
```

I.   What must be filled in line 1?
a.   Open("data.csv","r")
b.   open("data.csv")
c.   "data.csv"
d.   File

II.   What must be filled in Line 2?
a.   csv.reader()
b.   csv.read()
c.   csv.write()
d.   csv.writer()

III.   What must be filled in line 3?
a.   data.csv
b.   f
c.   r
d.   None

IV.   What must be filled in line 4?
a.   data
b.   f
c.   "File"
d.   row

V.   What is the default data type of data read from this file?
a.   List
b.   String
c.   Tuple
d.   Integer

22. Sudev, a student of class 12th, is learning CSV File Module in Python. During examination, he has been assigned an incomplete python code to create a CSV file 'customer.csv' .Help him in completing the code which creates the desired CSV file.

Cus_No	Name	Ph_No
11	Rohit	8567843243
12	Sonal	9645342345

```
_____csv  #Statement 1
def Create_CSV():
    fw=open("customer.csv","w")
    _____=csv.writer(fw)                #Statement2
    csvwriter.writerow(["Cus_No","Name","Ph_No"])
    n=int(input("Enter total number of Customer"))
    for i in range(n):
        cusno=int(input("Enter    Customer    no."))
        Name=input("EnterName")
        Ph_No=int(input("EnterPhone        No."))
        Rec=[cusno,Name,Ph_No]
        csvwriter.writerow(_____) #Statement 3
    fw.close()

def Display_CSV():
    fr=open(_____,"r")  #Statement  4
    cusreader=csv.reader(fr)
    i=0
    for_____in cusreader: #Statement 5if
      i%2==0:
         print(rec[0],'\t',rec[1],'\t',rec[2])
      else:
         pass
      i+=1
    fr.close()


Create_CSV()
Display_CSV()
```

I.   Identify suitable code for the blank space in line marked as Statement-1.
a)   include
b)   add
c)   Import
d)   import

II.   Identify the missing code for the blank space in line marked as Statement-2.
a)   Customer
b)   reader
c)   csvwriter
d)   writer

III.   Identify the argument name for the blank space in line marked as Statement-3?
a)   Row
b)   Rec
c)   row
d)   rec

IV.   Identify the missing file name for the blank space in line marked as Statement-4?
a)   customer
b)   customer.csv
c)   customer.txt
d)   customer.dat

 V .Identify the object name for the blank space in line marked as Statement-5?

a)   i
b)   Rec
c)   row
d)   rec

23. Daya of class 12 is writing a program to create a CSV file "empdata.csv" with empid, name & mobile number. Also to search a particular empid and display its record details. He has written the following code. As a programmer, help him to successfully execute the given task.

```
import_____#Line1
fields=['empid','name','mobile_no']
rows=[['101','Rohit','8982345659'],['102','Shaurya','8974564589']]
filename="empdata.csv"
f=open(filename,'w',newline='')
csv_w=_____#Line2
```

```
    for row in rows:
        csv_w._____#Line3
    f.close()
    f=open(filename,'r')
    csv_r=_____#Line4
    ans='y'
    while    ans=='y':
        found=False
        emplid=input("Enter employee id to search=")
        for row in csv_r:
            if    len(row)!=0:
                print(row[0])
                if_____==emplid:    #Line5
                    print("Name : ",row[1])
                    print("Mobile  No  :  ",row[2])
                    found=True
                    break
        if not found:
            print("Employee id not found")
    ans=input("Do you want to search more? (y)")
```

Choose the module he should import in Line 1.
a)   math
b)   pickle
c)   csv
d)   random

II.   Choose a code to write the column heading from fields list in Line2.
a)   writerows(fields)
b)   writerow(field)
c)   writerow(fields)
d)   writerows(fields)

III.   Choose a code to write the row from rows list in Line3.
a)   writerows(row)
b)   writerow(row)
c)   writerow(rows)
d)   write_row(row)

IV.   Choose a code for line 4 to read the data from a csv file.
a)   csv.reader(f)
b)   csv.read(f)   d)   pickle.load(f)   e)   f.read()

V. Choose the correct variable (list value) to check "emplid" in Line5

a)   Row[0]
b)   Rec[0]
c)   row[0]
d)   rec[0]

24.Viraj is making a software on "Countries and their Capitals" in which various records are to be stored/retrieved in "CAPITAL.CSV" data file. It consists of few records of Countries and their Capitals. He has written the following code in python. As a programmer, you have to help him to successfully execute the program.

```
import csv
# Function to add a new record in CSV file
def_____(Country,Capital):      #      Statement-1
        f=open("CAPITAL.CSV","_____") # Statement-2
        fwriter=csv.writer(f)
        fwriter.writerow([_____]) # Statement-3


            f.close()
def ShowRec(): # Fn. to display all records from CSV file
        with open("CAPITAL.CSV","r") as NF:
                    NewReader=csv._____(NF)  #  Statement-4
                    for rec in NewReader:
                            if len(rec)!=0:
                                    print(rec[0],rec[1])
AddNewRec("INDIA","NEW DELHI")
AddNewRec("CHINA","BEIJING")
ShowRec() # Statement-5
```

I.   Choose the Name of the function in Statement-1.
a)   AddNewRec
b)   Addnew
c)   Addrec
d)   AddNewRec()

II.   Choose the file mode to be passed to add new records in Statement-2.
a)   w
b)   r
c)   w+
d)   a
III.   Identify the correct variables in Statement-3 to store data to the file.

a) country,capital
b) Country,Capital
c) Coun,Cap
d) [Country,Capital]

IV. Choose the correct option for Statement-4 to read the data from a csv file.
a) Reader()
b) reader()
c) read
d) reader

V. Choose the output which will come after executing Statement-5.
a) 'INDIA NEW DELHI' 'CHINA BEIJING'
b) 'CHINA' 'BEIJING'
c) INDIA NEW DELHI
 d)None of the above

25. Rinsha of class 12 is writing a program to create a CSV file "user.csv" which will contain user name and password for some entries. She has written the following code. As a programmer, help her to successfully execute the given task.

```
import_____# Line 1

def addCsvFile (UserName, PassWord): # to write / add data into the CSV file

    f = open ('user.csv', '_____') # Line 2
    newFileWriter = csv . writer ( f )
    newFileWriter . writerow ( [ UserName, PassWord])
    f . close ( )

    # csv file reading code
  def readCsvFile ( ):
    with open ('user.csv', 'r') as newFile:

            newFileReader = csv ._____ (newFile) #Line3

            for row in newFileReader :
                    print (row[0], row [1])
                    newFile ._____# Line 4

addCsvFile ("Biplab", "123@456")
addCsvFile("Arunima","aru@nima")
addCsvFile("Poonam",myname@FRD")
readCsvFile ( ) # Line 5
```

I. Name the module she should import in Line 1.
a.   CSV
b.   csv
c.   math
d.   File

II. In which mode, Rinsha should open the file to add data into the file.
a.   r
b.   a
c.   w
d.   w+

III. Fill in the blank in Line 3 to read the data from a csv file.
a.   writer()
b.   reader()
c.   write()
d.   read()

IV. Fill in the blank in Line 4 to close the file.
a.   End()
b.   Close()
c.   close()
d.   end()

26. Consider the following csv file and the code fragment associated with the following csv file :

SLNO	BOOKNAME	PRICE
1	Pride and Prejudice	200
2	Gone with the Wind	250
3	The little prince	170
4	Anne of Green Gables	190
5	The Giving Tree	210

```
import csv
f=open("c:\\stud.csv")
fobj=csv.reader(f)
for k in fobj:
    for j in k:
        print(j,  end='')
        break
f.close()
```

I.What will be the output printed by the above code?

a. SLNO12345
b. SLNO
c. The entire content
d. Error

II. What will be the output printed by the above code if the break is replaced with continue?
a. SLNO12345
b. SLNO
c. The entire content
d. Error

III. What will occur if the file stud.csv is not existing in the mentioned path?
a. It will create a new one
b. It will create an error
c. None of the above
d. It will cause a system reboot

IV. Which statement in the above code will help to move to the next record?
a. fobj.next()
b. next(fobj)
c. fobj.move()
d. fobj.forward()

27. Sai Krishna has created the following csv file named item.csv:

ITEMNO	NAME	PRICE
101	PENCIL	5
102	PEN	10
103	NOTE BOOK	15

He has written the following program for managing the file. Help him to find the answers for the following questions.

```
csvfile=open("c:\\item.csv","r")
csvr=csv.reader(csvfile)
head=next(csvfile)
print(head)#Line1
for  i  in  csvr:
    print(i)#Line2
    break
else:
    print(i)#Line3
k=next(csvfile)
print(k)#Line4
_____#Line5
```

I. What will be printed by Line1?
a.   All the records
b.   ITEMNO, NAME, PRICE c.item.csv
d.   None of the above

II. What will be printed by Line2?
a.   101,PENCIL,5
b.   ITEMNO, NAME, PRICE c.102,PEN,10
d.   103,NOTEBOOK,156

III. What will be printed by Line3?
a.   103,NOTEBOOK,15
b.   Line 3 will not be executed
c.   Line 3 will be executed , but nothing will be printed
d.   102,PEN,10

IV. What will be printed by Line4?
a.   101,PENCIL,5
b.   ITEMNO, NAME, PRICE
c.   102,PEN,10
d.   103,NOTEBOOK,15

V. What must be written in Line 5?
a.   F.close()
 b.   f.close()
 c.   fobj.close()
 d.   csvfile.close()

ANSWERS

QNO	OPT	QNO	OPT	QNO	OPT	QNO	OPT
1	A	6	b	11	a	16	d
2	B	7	b	12	c	17	a
3	C	8	c	13	d	18	a
4	B	9	a	14	c	19	c
5	B	10	b	15	d	20	d

QNO		OPT	QNO		OPT	QNO		OPT
	I	b		I	d		I	c
	II	a		II	c		II	c
21	III	c	22	III	b	23	III	b
	IV	d		IV	b		IV	a
	V	b		V	d		V	c

QNO		OPT	QNO		OPT	QNO		OPT
	I	d		I	b		I	b
	II	d		II	b		II	c
24	III	b	25	III	b	26	III	b
	IV	D		IV	c		IV	b
	V	b						

QNO		OPT
	I	b
	II	a
27	III	b
	IV	c
	V	b

DATA STRUCTURE

INTRODUCTION

We know that computers store and process data with an extra ordinary speed and accuracy. So, it is highly essential that the data is stored efficiently and can be accessed fast. Also, the processing of data should happen in the smallest possible time but without losing the accuracy.

Data structures deal with how the data is organized and held in the memory when a program processes it.

• Data structures are fundamental concepts of computer science which helps in writing efficient programs in any language.

• A data structure is a named group of data of different data types which is stored in a specific way and can be processed as a single unit.

• A data structure has well-defined operations, behavior and properties.

Data type vs Data structure

• A data type defines a set of values along with well-defined operations stating its input-output behavior.

• A data structure is a physical implementation that clearly defines a way of storing, accessing, manipulating data stored in a data structure.

For example, List as a data type which can store heterogeneous data type of elements, but when implemented as data structure its behavior is clearly prescribed (searching, sorting etc.)
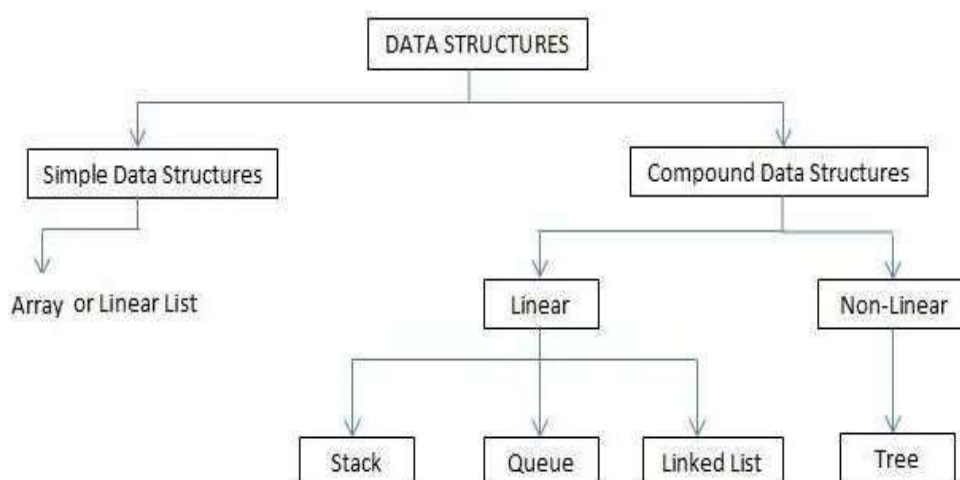
List

• Lists in Python are used to store collection of heterogeneous items.
• These are mutable, which means that you can change their content without changing their identity.
• You can recognize lists by their square brackets [and] that hold elements separated by a comma.
• Lists are built into Python: you do not need to invoke them separately.

Stack

A stack is a container of objects that are inserted and removed according to the Last-In-First-Out (LIFO) concept.

• Think of a scenario where at a dinner party where there is a stack of plates, plates are always added or removed from the top of the pile.
• In computer science, this concept is used for evaluating expressions and syntax parsing, scheduling algorithms/routines, etc.

Linear List
• A linear data structure is that those elements form a sequence.
• When elements of linear structure are homogeneous and are represented in memory by means of sequential memory locations, these linear structures are called arrays.
• Linear List size: Length=UB-LB+1

Stack
Stack is a linear/sequence structure in which insertion and deletion can take place only at one end, i.e., stack's top. Because of this, stack is called LIFO (Last in First out) data
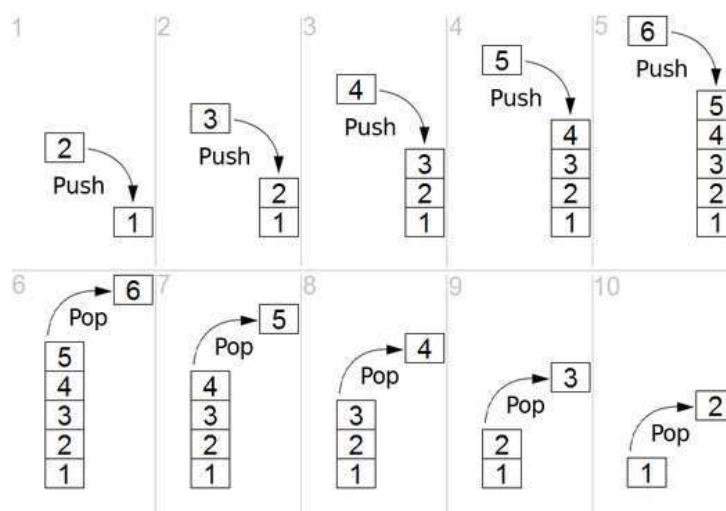
structure. For example, a pile of books, a stack of coins where you can remove only the top book or the coin placed at the top.

Implementation of stack using list

• The implementation of stack using list in Python is the easiest of all programming language.

• Basic operations performed on stack are:

1. Creating a stack
2. Push/Adding elements to the stack
3. Checking for empty stack
4. Pop/Deleting elements from a stack
5. Traversal/Displaying a stack

List methods used and Important things to remember

1)   list.append(element) – It is used to implement push operations(used to append or add elements at the end of the list)

2)   list.pop() –It is used to implement pop operations(removing elements at the end)

3)   list[::-1]-List slicing is used to print the elements in the reverse order from top position to list[0]

4)   top=len(list)-1 (length of list -1)

5)   stack - LIFO(Last In First Out)

6)   Push and Pop through one end(Top)

Applications of Stack

1. Reversing a word/line: This can be accomplished by pushing each character on to a stack as it is read. When the line is finished, characters are popped off the stack and they will come off in the reverse order.

2.The compilers use stacks to store the previous state of a program when a function is called during recursion.

2. Backtracking is a form of recursion. But it involves choosing only one option out of possibilities. Used in solving Puzzle Sudoku.

3. Undo mechanism in Text editors by keeping all the text changes in a stack.

Implementation of stack – menu oriented program

```python
S=[]
from os import system
def menu():#menu display
        ch=0
        while(ch<1 or ch>4):
        anyvar=system('cls')
        #print ("\n"*100)
        print ("\n\n\n\n\n")
        print ("\t\t\t1: PUSH")
        print ("\t\t\t2: POP")
        print ("\t\t\t3: DISPLAY")
         print ("\t\t\t4: EXIT")
        ch=int(input("\n\t\t\tEnter a choice (1-4):"))
        return ch
def push():#code to push an item
        item=int(input("\t\t\tEnter an item to push: "))
        S.append(item)
        print ("\t\t\tITEM " , item ," PUSHESD IN THE STACK")
 def pop():#code to pop from stack
 if (S==[]):
          print ("\t\t\tNO ITEM TO POP")
 else:
          item=S.pop()
    print ("\t\t\tITEM " , item ," POPPED FROM THE STACK")
 def display():#code to display stack
        if (S==[]):
                print ("\t\t\tEMPTY STACK")
        else:

                print ("\t\t\t",)
        for i in S:
                print( i ,' ',end="")


    #code to call all
```

```
#code to call all
functions import sys
ch=0
while(ch!=4):
        ch=menu()
        if(ch==1):

                push()
        elif(ch==2):

                pop()
        elif(ch==3):

                display()

        elif(ch==4):
            print ("\t\t\tABORTING PROGRAM         ")
            sys.exit()
```

SAMPLE QUESTIONS:

MCQ/Very Short Answer Type Questions(1-mark)

1.   Choose the correct output for the following stack operation(* top position)

Push
(5)
Push
(8)
Pop()
Push
(2)
Push
(5)
Pop()
Push
(1)

(a) 8 5 2 5 1*
(b) 8 5 5 2 1*
(c) 2 5 5 1*
(d) 5 2 1*

(e) Which list method can be used to perform Push operation in a stack implemented by list?

(f) append()

(g) extend()

(h) push()

(i) insert()

2. Which list method can be used to perform Pop operation in a stack implemented by list?

(a) pop()

(b) pop(1)

(c) remove()

(d) pop(0)

4. Consider the following operation performed on a stack of size 3, What will be the output? (* top position)

Push(10)
Push(20)
Push(30)
Pop()
Push(40)
Push(50)

(a) overflow

(b) underflow

(c) 10 20 30 40 50*

(d) 10 20 40 50*

5. Based on the below given code, Write answer to the following questions i to v

```
#function
definition def
push(colour,n)
:
– – – – – – – – – – – – – – – –    # statement1

#function
calling
colour=[]
c=['red','blue','violet','white','black']
for i in range(0,len(c),2):
    ..................... # statement2
print(colour[::-1])
```

```
#function definition
def pop(colour):
    if ........................ #statement 3
        return "underflow"
    else:
        return .................. #statement 4
#function calling
for i in range(len(colour)+1):
    print(...................... )#statement 5
```

(i)   Identify the suitable code for statement 1?

a)   colour.insert(len(colour),n)
b)   colour.append(len(colour),n)
c)   colour.append()
d)   colour.extend()

(ii)   Identify the suitable code for statement 2?

a)   push(colour,c[i])
b)   push(colour)
c)   push(c[i])
d)   push(colour,i)

(iii)   Identify the suitable code for statement 3?

a)   colour==[]:
b)   colour.isEmpty():
c)   len(colour)=0:
d)   None of the above

(iv)   Fill in the statement to delete an element from the stack?

a)   colour.pop(1)
b)   colour.pop()
c)   del colour[1]
d)   colour.delete(1)

(v)   Fill the statement 5,to call pop function
a)   pop(c)

b)   pop(colour)

c)   call pop(colour)

d)   def pop(colour)

6.   What do you mean by Data Structure?

7.   LIFO data structure is?

8.   Can we have nested list?

9.   Name one linear data structure.

10.   Name one non-linear data structure.

11.   Name the operation for insertion in a stack.

12.   Name the operation for deletion from a stack.

13.   Name the function to find length of a list.

14.   Indexing in list starts from?

Short Answer Type Questions(2-marks)

1. How is Data Structure different from Data Type?
2. Define Stack and Queue
3. Name some operations commonly performed on data structures?
4. What is a list?
5. What is traversing? Write python code to traverse a list.
6. Name the methods used for inserting and deleting elements from a list.
7. Write some applications of stack.

Application based Short Answer Type Questions(2-marks)

8. Predict the output with respect to the list L=[40,20,30,10,50]

        (a) print(L)

        (b)   print(len(L))

        (c) L.pop() ; print(L)

        (d) L.append(70); print(L)

        (e) L.sort(); print(L)

9. Find the output:

        (a) secondlist=[1,2,3,[4,5,[6,7,8],9],10,11]

              print(len(secondlist))

        L=[1, 2, 3, [4, 5, [6, 7, 8], 9] ,10, 11]

        (b) L[1]

        (c) L[3]

        (d) L[3][1]

(e) L[3][2][0]

(f) L[3][2]

(g) L[3][2][1]

(h) L[3][3]

10. Predict the output:

(a) b=[[9,6],[4,5],[7,7]] X=b[:2]
      X.append(10)
      print(X)

(b) b=[[9,6],[4,5],[7,7]] X=b[:2]
      X[1].append(10)
      print(X)

11. Consider STACK=['a','b','c','d']. Write the STACK content after each operations:

a) STACK.pop( )

b) STACK.append('e')

c) STACK.append('f')

d) STACK.pop( )

12. Write a program to implement a stack for the students(studentno, name). Just implement Push.

13. Write a program to implement a stack for the students(studentno, name). Just implement Pop and display.

14. If
L=["Python", "is", "a", ["modern", "programming"], "language", "that", "we", "use"] ,
then find the output:

a) L[0][0]

b) L[3][0][2]

c) L[3:4][0]

d) L[3:4][0][1]

e) L[3:4][0][1][3]

f) L[0:9][0]

g) L[0:9][0][3]

h) L[3:4][1]

15. What is the difference between pop() and pop(0)?

Long Answer Type Questions (3-marks)

1.   Write a program for linear search in a list.

2.   Write a program for bubble sort.

3.   Write PushOn(Book) and Pop(Book) methods/functions in Python to add a new Book and delete a Book from a list of Book titles, considering them to act as push and pop operations of the Stack data structure.

4.   Write functions in python for performing stack operations implemented by using list and also write a function for the menu driven operations to implement all the stack operations? (Hint: Use global variables)

5.   Write a function in python to perform Push Operation in a stack implemented by using list. Maximum size of the stack can be input by the user along with original stack and also display the top position and stack elements after push operation.

>>> li=[3,4,5]
>>> push(li,5)
enter the element:20

Top position after Push operation: 3 stack after Push operation: [20, 5, 4, 3]

6.   Write a function in python to perform Pop Operation in a stack implemented by using list. Print the element deleted, top position and also display the stack elements before and after the pop operation?
>>> li=[20,5,4,3]
>>> pop(li)
Original stack [3, 4, 5, 20]
Top position: 3
Deleted element 3
stack after Pop Operation: [4, 5, 20]

7.   Write a function in python to display elements of a stack implemented by using list. Use both traditional and python methods. Print stack empty message, if elements are not there.
>>> li=[20,5,4,3]
>>> display(li)
Stack elements: [3, 4, 5, 20]
>>> displaytraditional(li) Stack elements:
3 4 5 20
>>> l2=[]
>>> display(l2) Stack empty

8. Write a function in Python PUSH(Arr),where Arr is a list of numbers, from this list push all even numbers into a stack implemented by using a list. Display the stack if it has at least one element, otherwise display "stack empty" message.

>>> li=[1,6,89,100,25,29]
>>> push(li)

The item 1 can't be inserted because it is not an even number The item 89 can't be inserted because it is not an even number The item 25 can't be inserted because it is not an even number The item 29 can't be inserted because it is not an even number
Stack elements after push operation : [100, 6]

9. Write a function in Python PUSH(mydict,maxsize=5),where mydict is a dictionary of phone book(name and mobile numbers), from this dictionary push all phone numbers to a stack implemented by using list and also the display the numbers that Display the stack if it has at least one element, otherwise display "stack empty" message

>>>mydict={1234567890:"Shyam",94567892:"Ram",8657456789012:
"Karun",9674123789:"Tharun"}
>>> push(mydict)

Stack elements after push operation :
[[1234567890, 94567892, 8657456789012, 9674123789]]

10. Write a function in Python PUSH(mydict),where mydict is a dictionary of phone book(name and mobile numbers), from this dictionary push only phone numbers having last digit is greater than 5 to a stack implemented by using list and also display the stack if it has at least one element, otherwise display "stack empty" message.

>>> mydict={9446789123:"Ram",8889912345:"Sam",7789012367:"Sree"}
>>> push(mydict)

Phone number: 9446789123 last digit is less than five which can't be pushed Stack elements after push operation : [7789012367, 8889912345]

11. Write a function in Python PUSH(mydict),where mydict is a dictionary of phone book(name and mobile numbers), from this dictionary push only phone numbers having 10 digits into a stack implemented by using list . Display the stack if it has at least one element, otherwise display "stack empty" message.

>>>mydict={1234567890:"Shyam",94567892:"Ram",8657456789012:"Karun",
9674123789:"Tharun"}
>>> push(mydict)

Digit of phone number 8
Phone number: 94567892 doesn't have 10 digits,which can't be pushed Digit of phone number 13
Phone number: 8657456789012 doesn't have 10 digits,which can't be pushed Stack elements after push operation : [9674123789, 1234567890]

12.   Write a function in Python PUSH(Arr),where Arr is a list of numbers, From this list push all numbers divisible by 5 in to a stack implemented by using a list. Display the stack if it has at least one element, otherwise display appropriate error message.

    >>> li=[10,2,5,6,15,30]
    >>> push(li)

The item 2 can't be inserted because it is not divisible by 5 The item 6 can't be inserted because it is not divisible by 5 Stack elements: [30, 15, 5, 10]

13.   Write a function in Python POP(Arr),where Arr is a stack implemented by a list of numbers. The function returns the value deleted from the stack and stack status after pop operation.

    >>> li=[10,20,30,40,50]
    >>> dele,st=pop(li)
    Original stack [50, 40, 30, 20, 10]
    >>> print("Element deleted=",dele,"Stack after deletion",st[::-1])
    Element deleted= 50
    Stack after deletion [40, 30, 20, 10]
    Or
    >>> pop(li)
    Original stack [40, 30, 20, 10]
        (40, [10, 20, 30])

ANSWER KEY

<u>I.</u>   MCQ/ Very Short Answer Type Questions(1-mark)

1.   (d) 5 2 1*
2.   (a) append()
3.   (a) pop()
4.   (a) overflow
5.
    (i).   a colour.insert(len(colour),n)
    (ii).   a push(colour,c[i]) (iii).a colour==[]
    (iii).   b colour.pop()
    (iv).   b colour.pop()
    (v).   b pop(colour)
6.   Data Structure means organization of data. A data structure has well defined operations or behaviour.
7.   STACK
8.   Yes
9.   Lists
10.   Graphs
11   PUSH

12   pop

13.   len()

14.   0

Short Answer Type Questions(2-marks)

1.   Data Structure provides information regarding organization of data whereas Data Type provides information regarding the domain of values and operations that can be performed on data.

2.   Stack – A stack is a linear list also known as LIFO list with the special property that items can be added or removed from only one end called the top.

Queue – A queue is a linear list also known as FIFO list with the special property that items can be added at one end and removed from the other.

3.   Traversal, Insertion, Deletion, Searching, Sorting, Merging etc.

4.   A list is a mutable sequence of data elements indexed by their position. A list is represented using [ ] . e.g L=[10,20,30]

5.   Traversing means accessing or visiting or processing each element of any data structure.

 L=[10,20,30,40,50]

 for x in L:

      print(x)

6.   Various methods for inserting elements in a list are - insert(), append(), extend() and methods used for deleting items from a list are – pop() , remove(), clear()

7.   Reversing a string, compilers use stack to store previous state of program, undo mechanism in text editors and backtracking.

Application based Short Answer Type Questions(2-marks)

8.   (a) Ans: [40, 20, 30, 10, 50]

      (b)   Ans: 5

      (c)   Ans:50

             [40, 20, 30, 10]

      (d)   Ans: [40, 20, 30, 10, 70]

      (e)   Ans: [10, 20, 30, 40, 70]

9.   (a) Ans:6

      (b)   Ans: 2

      (c)   Ans:[4, 5, [6, 7, 8], 9]

      (d)   Ans:5

      (e)   Ans:6

      (f)   Ans: [6, 7, 8]

      (g)   Ans:7

      (h)   Ans:9

10. (a) Ans: [[9, 6], [4, 5], 10]
    (b) Ans: [[9, 6], [4, 5, 10]]

11. Ans: ['a', 'b', 'c']
    Ans: ['a', 'b', 'c','e']
    Ans: ['a', 'b', 'c','e','f']
    Ans: ['a', 'b', 'c','e']

12.
```python
stk=[]
top=-1
def PUSH(stk,student):
        stk.append(student)
        top=len(stk)-1
        sno=int(input("Enter student No:"))
        sn=input("Enter student Name:")
        data=[sno,sn]
PUSH(stk,data)
```

13. Ans: Program for pop and display operation in a stack
```python
stk=[1,2,3,4]
top=len(stk)-1
def POP():
        global top
        if(top==-1):
                print("NO STUDENT DATA, Stack Empty")
        else:
                print("Element popped:", stk.pop())
                top=len(stk)-1
def display():
        global top
        if(top==-1):
                print("NO STUDENT DATA")
        else:
                print("Elements in stack")
                for i in range(top,-1,-1):
                        print(stk[i])
POP()
display()
```

14.　　(a)　　Ans: 'P'
　　　　(b)　　Ans: 'd'
　　　　(c)　　Ans: ['modern', 'programming']
　　　　(d)　　Ans: 'programming'
　　　　(e)　　Ans: 'g'
　　　　(f)　　Ans: 'Python'
　　　　(g)　　Ans: 'h'
　　　　(h)　　Ans: IndexError: list index out of range

15. Ans: pop() will delete the last element of a list whereas pop(0) will delete element at index zero of a list

Long Answer Type Questions (3-marks)

1.
```
L=eval(input("Enter the elements: "))
n=len(L)
item=eval(input("Enter the element that you want to search : "))
for i in range(n):
if L[i]==item:
        print("Element found at the position :", i+1)
         break
else:
        print("Element not Found")
```

2.
```
L=eval(input("Enter the elements:"))
n=len(L)
for p in range(0,n-1):
        for i in range(0,n-p-1):
                if L[i]>L[i+1]:
                        t=L[i] L[i]=L[i+1]
                        L[i+1]=t
print("The sorted list is : ", L)
```

3.
```
def PushOn(Book):
        a=input('enter book title :')
        Book.append(a)
def Pop(Book):
        if (Book ==[ ]):
                print("Stack empty")
        else:
                print("Deleted element :")
                print(Book.pop())
```

```
4
# declaration of global variables
stack=list()
maxsize=5
# 1.Push operation
def push(ele):
        top=len(stack)-1
        if(top==maxsize-1):
                print("Overflow")
        else:
                stack.append(ele)
# 2.Pop operation
def pop():
        top=len(stack)-1
        if(top== -1):
                print("Underflow")
        else:
                print("Deleted element",stack.pop())
# 3.Display operation
def display():
        if(stack==[]):
                print("Stack empty")
        else:
                print("Stack  elements",stack[::-1])
# 4.Menu operations @ __main__
def mainfun():
        option=True
        while(option==True):
                print("Menu-Stack Operations")
                print("1 : Push")
                print("2 : Pop")
                print("3 : Dispay")
                choice=int(input("Enter your choice"))
                if choice ==1:
                        ele=int(input("Enter the element"))
                        push(ele)
                elif(choice==2):
                        pop()
                elif(choice==3):
                        display()
                else:
                        print("Wrong Choice")
                option=input("Press any key to continue/Press No to exit")
                if(option.upper()=="NO"):
                        option=False
                else:
                        option=True

# 5.function calling statement
mainfun()
```

5. #Stack operation-Push

```python
def push(stack,maxsize=5):

    ele=int(input("enter the element:"))

    top=len(stack)-1
    if(top==maxsize-1):
        print("Overflow")
    else:
        stack.append(ele)
        top=top+1
        print("Top position after Push operation:",top)
        print("stack after Push operation:",stack[::-1])
```

6. #stack operation-Pop

```python
def pop(stack):
    top=len(stack)-1
    print("Original stack",stack[::-1])
    if(top== -1):
            print("Underflow")
    else:
            print("Top position:",top)
            print("Deleted element",stack.pop())
            print("stack after Pop Operation:",stack[::-1])
```

7. Ans: Program for pop and display operation in a stack

```python
def display(stack):
        if(stack==[]):
                print("Stack empty")
        else:
                print("Stack  elements:",stack[::-1])
#Display operation-Traditional style
def displaytraditional(stack):
    top=len(stack)-1
    if(top==-1):
                print("Stack empty")
    else:
                print("Stack elements:")
                for i in range(top,-1,-1):
                        print(stack[i],end=" ")
```

8.
```python
def push(Arr):
        stack=list()
        maxsize=5
        for ele in Arr:
                top=len(stack)-1
                if(top==maxsize-1):
                        print("Overflow")
                elif(ele%2==0):
                        stack.append(ele)
                else:
                        print("The item",ele," can't be inserted because it is not an even number")
        if(stack==[]):
                print("Stack empty")
        else:
        print("Stack elements after push operation :",stack[::-1])
```

9.
```python
def push(mydict,maxsize=5):
        stack=list()
        phonebook=list(mydict)
        top=len(stack)-1
        if(top==maxsize-1):
                print("Overflow")
        else:
                stack.append(phonebook)
        if(stack==[]):
                print("Stack empty")
        else:
                print("Stack elements after push operation :",stack[::-1])
```

10.
```python
def push(mydict):
    stack=list()
    maxsize=5
    phonebook=list(mydict.keys())
    for mob in phonebook:
        lastdig=mob%10
        top=len(stack)-1
        if(top==maxsize-1):
                print("Overflow")
        elif(lastdig>=5):
                stack.append(mob)
        else:
                print("Phone number:",mob,"last digit is less than five which can't be pushed")
    if(stack==[]):
        print("Stack empty")
    else:
    print("Stack elements after push operation :",stack[::-1])
```

11.

```python
def push(mydict):
    stack=list()
    maxsize=5
    phonebook=list(mydict.keys())
    for mob in phonebook:
                l=len(str(mob))
                top=len(stack)-1
    if(top==maxsize-1):
                print("Overflow")
    elif(l==10):
                stack.append(mob)
     else:
                print("Digit of phone number",l)
                print("Phone number:",mob,"doesn't have 10 digits,which can't be
    pushed")
    if(stack==[]):
                print("Stack empty")
    else:
                print("Stack elements after push operation :",stack[::-1])
```

12

```python
def push(Arr):
        stack=list()
        maxsize=5
        for ele in Arr:
                top=len(stack)-1
        if(top==maxsize-1):
                print("Overflow")
        elif(ele%5==0):
                stack.append(ele)
        else:
                print("The item",ele," can't be inserted because it is not divisible by 5")
        if(stacK==[]):
                print("Stack empty")
         else:
                print("Stack elements after push operation :",stack[::-1])
```

13

```python
def pop(stack):
        print("Original stack",stack[::-1])
        if(stack==[]):
          print("Underflow")
         else:
          return stack.pop(),stack[::-1]
```

COMPUTER NETWORKS

INTRODUCTION

We are living in a connected world. Information is being produced, exchanged, and traced across the globe in real time. It's possible as almost everyone and everything in the digital world is interconnected through one way or the other.

A group of two or more similar things or people interconnected with each other is called network. Some of the examples of network in our everyday life includes:

• Social network

• Mobile network

• Network of computers

• Airlines, railway, banks, hospitals networks

What is Computer Network?

A Computer network is an interconnection among two or more computers or computing devices. Such interconnection allows computers to share data and resources among each other Resources such as files, applications, printers and software are common information shared in a networking.

The advantage of networking is

- Resource Sharing
- Collaborative Interaction
- Cost Saving
- Increased storage

- Time Saving

Evolution of Network:
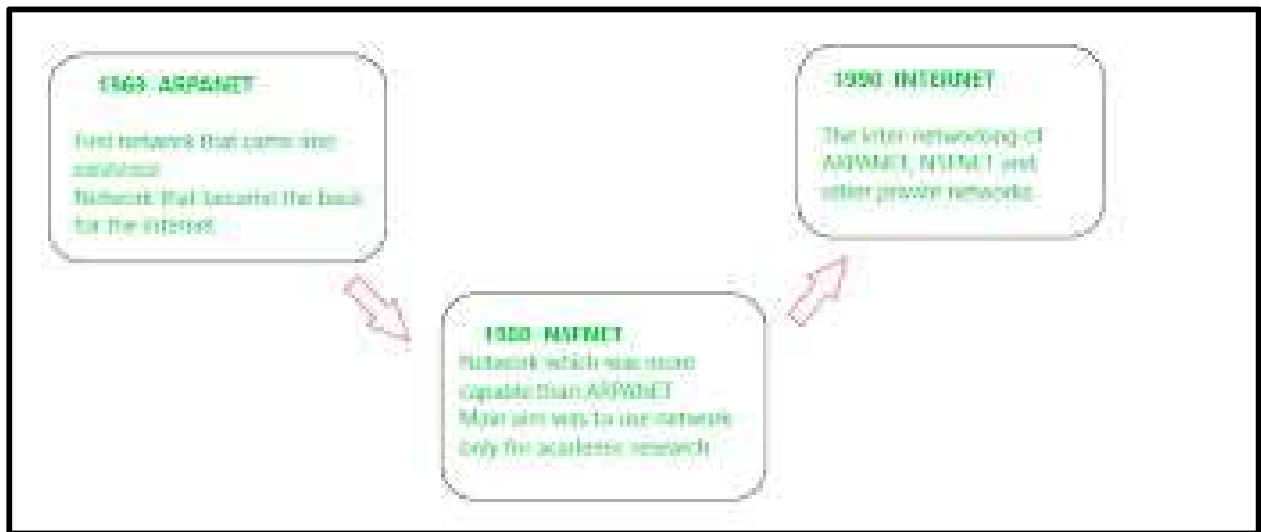
(I)ARPANET (Advanced Research Project Agency Network)

- It came into existence in 1960s

- A project for interconnecting, US department of defense with academic and research organization across different places for scientific collaboration.

(II)NSFNET (National Science Foundation Networks)

- It came into existence in 1986

- It was the first large-scale implementation of Internet technologies in a complex environment of many independently operated networks

(III) INTRANET

- It is a local or restricted communication system

- It is managed by a person or organization.

- Intranet users can avail services from internet but Internet user cannot access intranet directly

(III) INTERNET

- It came into existence in 1960s

- It is known as Network of Networks

- A global computer network providing variety of information and communication facilities consisting of interconnected networks using standardized communication protocols.

DATA COMMUNICATION TERMINOLOGIES

DATA

Data means information in digital form which is stored processed and exchanged between digital devices like computer, mobile phones or laptop.
Data can be text, image, audio, video or multimedia files.
Computers stores raw data and process these data into meaningful information. Hence, we can define Information as processed data.

COMMUNICATION

The exchange of information between two or more networked or interconnected devices is called communication. These devices must be capable of sending /receiving data over a communication medium.

COMPONENTS OF DATA COMMUNICATION

The five main components of data communication are as follows:
SENDER: Sender is a device which is capable of sending data over a communication network. In data communication Sender is also called Source.

RECEIVER: Receiver is a device which is capable of receiving data over a communication network. In data communication Receiver is also called Destination.

MESSAGE: message is the information being exchanged between a sender and a receiver over a communication network.

COMMUNICATION MEDIUM: Communication medium is the path or channel through which the information is moved from the sender to the receiver. A communication medium can be either wired/guided or wireless/unguided.

PROTOCOLS: The set of standard rules which are followed in data communication are known as Data Communication Protocols. All the communicating devices like sender receiver and other connected devices in the network should follow these protocols.
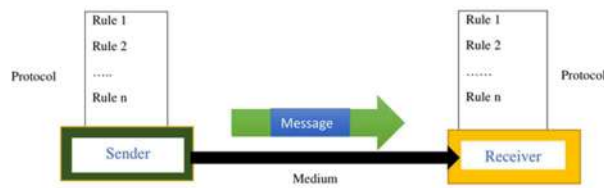
Why Protocols are needed?

The communicating devices may be in different geographical areas. The speed of these devices may be different. Also, the data transfer rates of different networks may be different. These complexities make it necessary to have a common set of rules to ensure the secure communication of data.

Examples of some commonly used Protocols in data communication are given below:

- Transmission Control Protocol (TCP)
- Internet Protocol (IP)
- File Transfer Protocol (FTP)
- Simple Mail Transport Protocol (SMTP)
- Hyper Text Transfer Protocol (HTTP)

MEASURING CAPACITY OF COMMUNICATION MEDIA

Capacity of a communication channel means the maximum quantity of signals that a communication channel can carry. The capacity of a communication medium is measured by its bandwidth and data transfer rate.

BANDWIDTH

Bandwidth is the difference between the highest and lowest frequencies a transmission media can carry.
 The unit of bandwidth is Hertz.

DATA TRANSFER RATES

Data transfer rate is the number of bits transmitted through a channel per unit of time. Data transfer rate is measured in bits per second (bps). It is also measured in Kilobits per second (Kbps), Megabits per second (Mbps) or Gigabits per second (Gbps).

IP ADDRESS

IP address or Internet Protocol address is a unique numeric address assigned to every device connected to a network. It uniquely identifies every node connected to a local network or internet.

An IP address allows computers to send and receive data over the internet. They can also be used to track down a user's physical location.There are two versions for IP address IPV4 and IPV6. IP addresses are binary numbers but are typically expressed in decimal form (IPv4) or hexadecimal form (IPv6) to make reading and using them easily.

The commonly used IP address is IPV4. An IPv4 address consists of four numbers, each of which contains one to three digits, with a single dot (.) separating each set of digits. Each of the four numbers can range from 0 to 255.

Example IP address: 24.171.248.170

SWITCHING TECHNIQUES

In large networks, there may be more than one paths for transmitting data from sender to receiver. The process of selecting a path of data out of the available paths is called switching. There are two popular switching techniques – circuit switching and packet switching.

1. Circuit Switching

In circuit switching, whenever a source end node wants to send a message to the destination end node a physical link is first established between the source and the destination. Then only the data transmission takes place. After the complete transmission of data this physical link is terminated.
Simple example of a circuit switching is telephone network in which a person calls another person. When the call receiving person receives the call, then only the connection is established. Then the message is conveyed and finally the connection is terminated.

Advantages:
1. Since a dedicated communication channel is set up before communicating the message, the data transmission is reliable and is suitable for long and continuous communication.
2 Circuit switching uses fixed bandwidth as well as data rates.
3. As the data is communicated continuously, no need of sequencing or re ordering it at the receiving end.

Disadvantages:
1. Time required to setup a physical connection between the sender and the receiver makes delay in communication
2. Since a communication channel is dedicated for a particular transmission, it cannot be utilized for other communication, even if the channel is free.
3. More expensive since connection has to be established every time before communication.

2. Packet Switching

In the packet switching technique, the whole message is split into small packets. Now, these packets are transmitted one by one from sender to the receiver through the intermediary switches in the network. The packets will take shortest path as possible.

Every packet will have a sequence number in order to identify their order at the receiving end. The packets will also contain information like source address, intermediate node address, destination address etc.

Advantages:

1. Packet switching is effective type of data transmission technique as it effectively utilizes the communication channel. Multiple users can share the channel simultaneously utilizing the bandwidth effectively.

2. It is cost effective and easy to implement compared to circuit switching.

3. As the messages are sent as small sized packets, the data transmission is quick and easy.

Disadvantages:

1. In packet switching the movement of packets may not be in correct order. Hence it is not suitable for voice communication.

2. Unorganized movement of packets makes it necessary to implement proper sequencing and reordering techniques.

3. As the packets flow through multiple paths from the source to the destination, complex security protocols are required to ensure reliable communication.

TRANSMISSION MEDIA

● A transmission medium can be anything that can carry signals or data between the source (transmitter) and destination (receiver). In data communication, transmission media are the links that carry messages between two or more communicating devices.

● Transmission can be classified as guided or unguided.

● In guided transmission, there is a physical link made of wire/cable through which data in terms of signals are propagated between the nodes. These are usually metallic cable, fiber-optic cable, etc. They are also known as wired media.

● In unguided transmission, data travels in air in terms of electromagnetic waves using an antenna. They are also known as wireless media.
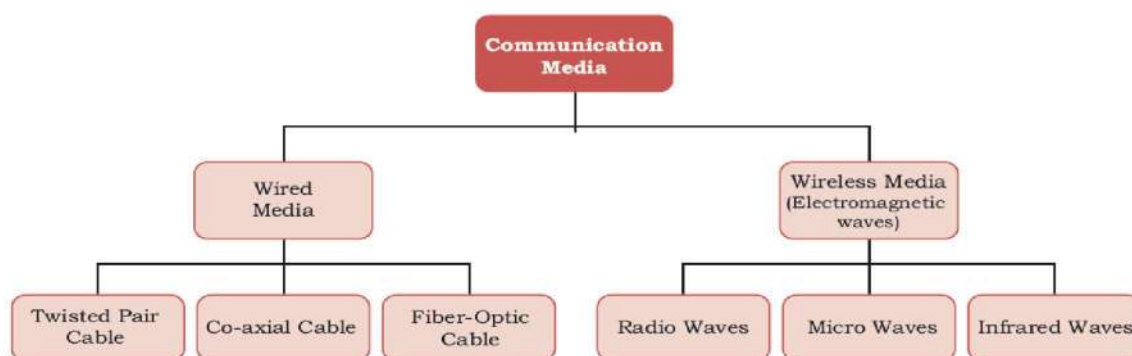
Wired Transmission Media

● Any physical link that can carry data in the form of signals belongs to the category of wired transmission media.

● Three commonly used guided/wired media for data transmission are, twisted pair, coaxial cable, and fiber optic cable.

● Twisted-pair and coaxial cable carry the electric signals whereas the optical fiber cable carries the light signals.

(A) *Twisted Pair Cable*

• A twisted-pair consists of two copper wires twisted like a DNA helical structure.

• Both the copper wires are insulated with plastic covers.

• Usually, a number of such pairs are combined together and covered with a protective outer wrapping.

Twisted Pair of Cables
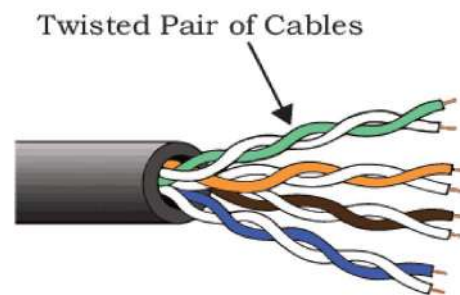
• The use of twisted configuration minimises the effect of electrical interference from similar pairs close by.

These cables are of two types: Unshielded twisted-pair (UTP) and Shielded twisted-pair (STP).

Shielded Twisted pair cable

Unshielded Twisted pair cable
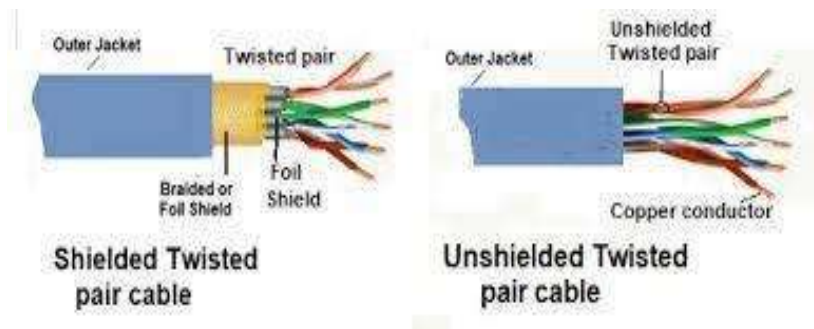
Advantages:

• It is low-cost, low-weight and flexible cables.

• It is easy to install and maintain and requires RJ-45 Connector.

Disadvantages:

• Suitable for short distance (up to 100 mt.). For long distance Repeater is required.

• It supports low bandwidth and offers up to 100 Mbps speed.

(B) *Coaxial cable*

•	Coaxial cable has a copper wire at the core of the cable which is surrounded with insulating material. The insulator is further surrounded with an outer conductor (usually a copper mesh). This outer conductor is wrapped in a plastic cover.

•	The shielded design allows the cable's copper core to transmit data quickly, without interference of environmental factors.

•	These types of cables are used to carry signals of higher frequencies to a longer distance.

•	It is better shielded and has more bandwidth than a twisted pair.

Coaxial cable
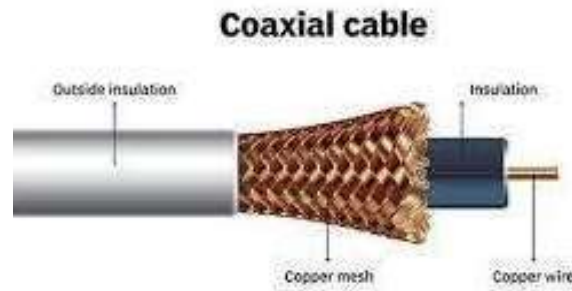
Advantages:

•	It offers high bandwidth and carry data for along distance (185-500 m)

•	Suitable for Broadband transmission (cable TV) and can be used in shared cable network.

Disadvantages:

•	It is less flexible and expensive compared to Twisted Pair cable.

•	Not compatible with modern cables like Twisted pair cable.

(C) *Optical Fibre*

•	The optical fiber cable carries data as light, which travels inside a thin fiber of glass.

•	Optic fiber uses refraction to direct the light through the media.

•	A thin transparent strand of glass at the center is covered with a layer of less dense glass called cladding. This whole arrangement is covered with an outer jacket made of PVC or Teflon.

•	These cables are of light weight and have higher bandwidth which means higher data transfer rate.
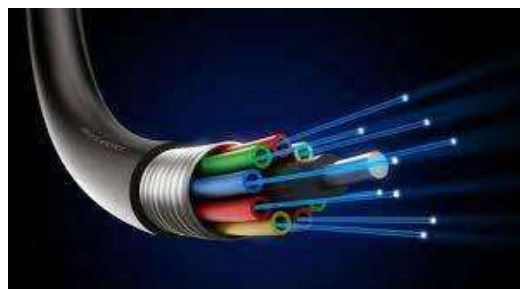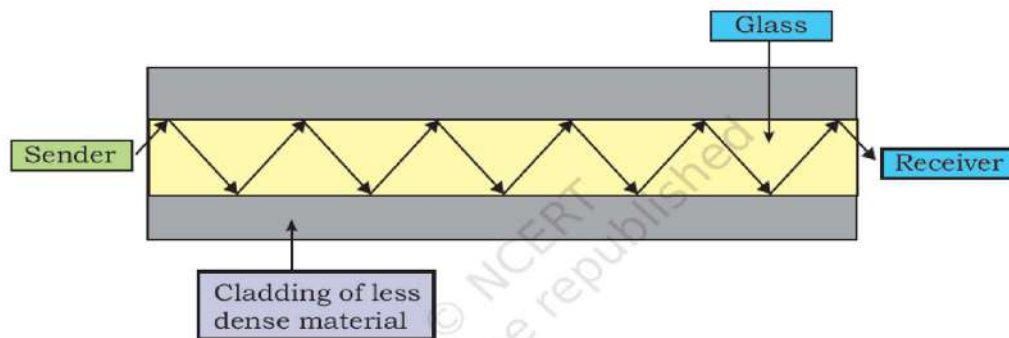
Advantages:

• It is free from Electro-Magnetic Interference (EMI), since no Electrical signal are carried.

• Offers secure and high speed transmission up to a long distance.

Disadvantages:

• Expensive and quite fragile (breakable).

• They are unidirectional

• Complicated Installation procedure and difficult to join two broken fiber.

• Not suitable for domestic purposes due to high maintenance cost.

Wireless Transmission Media

• In wireless communication technology, information travels in the form of electromagnetic signals through air.

• Electromagnetic spectrum of frequency ranging from 3 KHz to 900 THz is available for wireless communication.

• Wireless technologies allow communication between two or more devices in short to long distance without requiring any physical media.

There are many types of wireless communication technologies such as Bluetooth, WiFi, WiMax etc.

The electromagnetic spectrum range (3KHz to 900THz) can be divided into 4 categories (Radio waves, Microwaves, Infrared waves and Visible or Light waves) according to their frequency ranges.
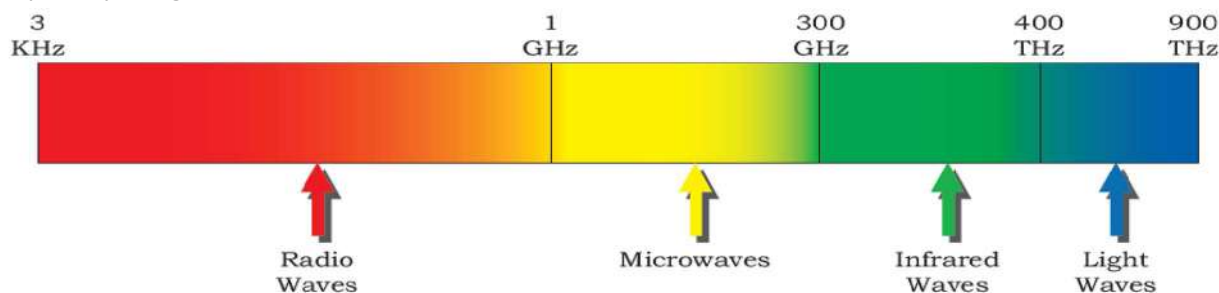
Classification of transmission waves and their properties

Transmission Waves	Properties
Radio Waves	1. Waves of frequency range 3 KHz - 1 GHz 2. Omni-directional, these waves can move in all directions 3. Radio waves of frequency 300KHz-30MHz can travel long distance 4. Susceptible to interference 5. Radio waves of frequency 3-300KHz can penetrate walls 6. These waves are used in AM and FM radio, television, cordless phones.
Microwaves	1. Electromagnetic waves of frequency range 1GHz - 300GHz. 2. Unidirectional, can move in only one direction. 3. Cannot penetrate solid objects such as walls, hills or mountains. 4. Needs line-of-sight propagation i.e. both communicating antenna must be in the direction of each other. 5. Used in point-to-point communication or unicast communication such as radar and satellite. 6. Provide very large information-carrying capacity.
Infrared waves	1. Electromagnetic waves of frequency range 300GHz - 400THz. 2. Very high frequency waves. 3. Cannot penetrate solid objects such as walls. 4. Used for short-distance point-to-point communication such as mobile-to-mobile, mobile-to-printer, remote-control-to-TV, and Bluetooth-enabled devices to other devices like mouse, keyboards etc.

Radiowave transmission
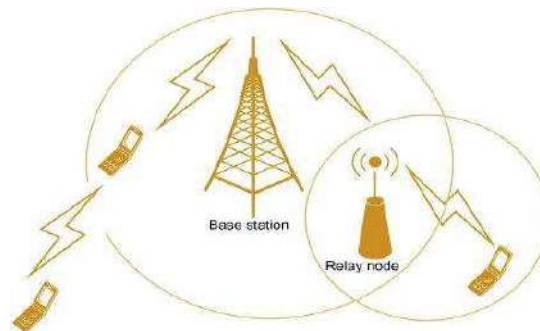
Microwave transmission   **Infrared transmission**
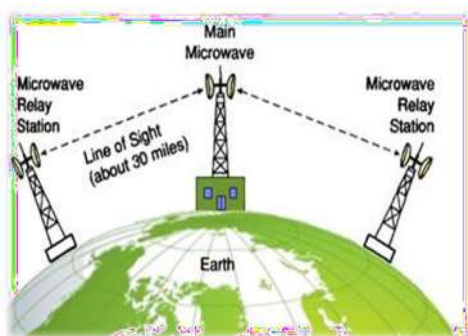
Network Devices

To communicate data through different transmission media and to configure networks with different functionality, we require different devices like Modem, Hub, Switch, Repeater, Router, Gateway, etc.

Modem
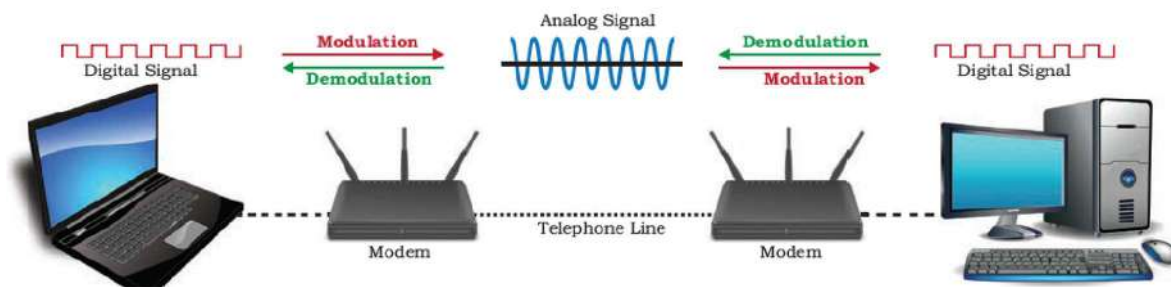
- Modem stands for 'MOdulator DEModulator'.
- It refers to a device used for conversion between analog signals and digital bits.
- It is used to transmit data from a sender to a receiver, or while browsing the internet, digital data are converted to an analog signal and the medium (be it free-space or a physical media) carries the signal to the receiver.
- There are modems connected to both the source and destination nodes.
- The modem at the sender's end acts as a modulator that converts the digital data into analog signals.
- The modem at the receiver's end acts as a demodulator that converts the analog signals into digital data for the destination node to understand.

Ethernet Card

- Ethernet card, also known as Network Interface Card (NIC) is a network adapter used to set up a wired network. It acts as an interface between computer and the network.
- It is a circuit board mounted on the motherboard of a computer
- The Ethernet cable connects the computer to the network through NIC.
- Ethernet cards can support data transfer between 10 Mbps and 1 Gbps (1000 Mbps). Each NIC has a MAC address, which helps in uniquely identifying the computer on the network.

RJ45

- RJ 45 or Registered Jack-45 is an eight-pin connector

- It is used exclusively with Ethernet cables for networking.

- It is a standard networking interface that can be seen at the end of all network cables.

- It is a small plastic plug that fits into RJ-45 jacks of the Ethernet cards present in various computing devices.

Repeater

- A repeater is a device that amplifies a signal being transmitted on the network.

- Data are carried in the form of signals over the cable.

- These signals can travel a specified distance (usually about 100 m).

- Signals lose their strength beyond this limit and become weak.

- In such conditions, the weakened signal appearing on the cable is regenerated and put back on the cable by a repeater.

Hub
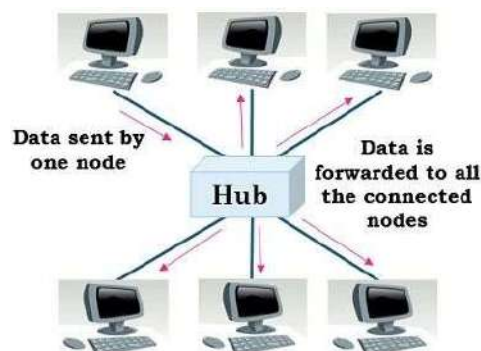
- An Ethernet hub is a network device used to connect different devices through wires. Data arriving on any of the lines are sent out on all the others. The limitation of Hub is that if data from two devices come at the same time, they will collide.

Switch
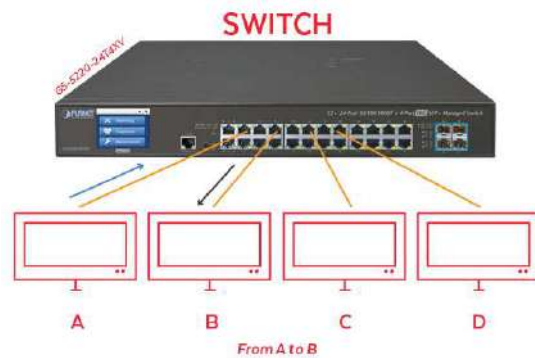
- Like a hub, a network switch is used to connect multiple computers or communicating devices.

- When data arrives, the switch extracts the destination address from the data packet and looks it up in a table to see where to send the packet.

- It sends signals to only selected devices instead of sending to all.

- It can forward multiple packets at the same time.

- A switch does not forward the signals which are noisy or corrupted. It drops such signals and asks the sender to resend it.

- Ethernet switches are common in homes/offices to connect multiple devices thus creating LANs or to access the Internet.

Router

- A router is a network device that can receive the data, analyses it, decide/alter how it is packaged and transmit it to other networks.

- A router connects a local area network to the internet.

- For example, data has been divided into packets of a certain size. Suppose these packets are to be carried over a different type of network which cannot handle bigger packets. In such a case, the data is to be repackaged as smaller packets and then sent over the network by a router.

- A router can be wired or wireless.

- A wireless router can provide Wi-Fi access to smartphones and other devices.

- Nowadays, home Wi-Fi routers perform the dual task of a router and a modem/ switch.

Gateway

- "Gateway" is a key access point that acts as a "gate" between an organisation's network and the outside world of the Internet.
- Gateway serves as the entry and exit point of a network, as all data coming in or going out of a network must first pass through the gateway in order to use routing paths.
- If a node from one network wants to communicate with a node of a foreign network, it will pass the data packet to the gateway, which then routes it to the destination using the best possible route.
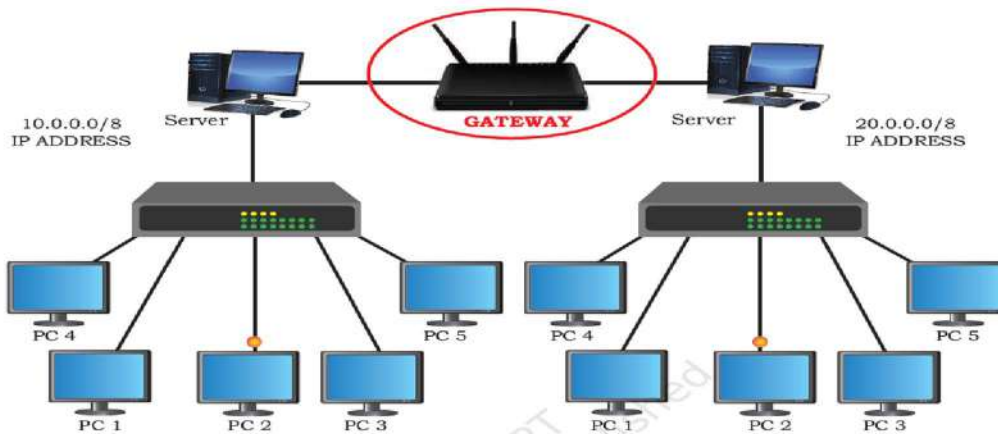
- For simple Internet connectivity at homes, the gateway is usually the Internet Service Provider that provides access to the entire Internet.
- Generally, a router is configured to work as a gateway device in computer networks.
- A gateway can be implemented completely in software, hardware, or a combination of both.
- Since a network gateway is placed at the edge of a network, the firewall is usually integrated with it.

WiFi card

- A Wi-Fi card connects to your laptop either in your USB port or a wider card slot.
- The Wi-Fi card acts as both a receiver and transmitter.

- It receives the wireless signal and communicates with the wireless network, enabling you to access the Web with your laptop.

Computer Network Types

A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.

A computer network can be categorized by their size, complexity and geographical spread. A computer network is mainly of four types:
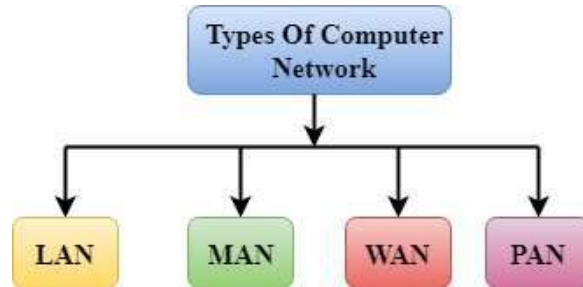
- LAN (Local Area Network)
- PAN (Personal Area Network)
- MAN (Metropolitan Area Network)
- WAN (Wide Area Network)

PAN (Personal Area Network)

- Personal Area Network is a network of information technology devices (laptop, mobile phones, media player and play stations) arranged within the range of an individual person, typically within a range of 10 meters / covers an area of 30 feet.
- Thomas Zimmerman was the first research scientist to bring the idea of the Personal Area Network.

LAN (Local Area Network)

- Local Area Network is a group of computers connected to each other in a small area such as a building, office through a communication medium such as twisted pair, coaxial cable, etc to share resources. Shared resources can be data, information,

programs, printers, hard-disks, modem etc. The data is transferred at an extremely faster rate, and provides higher security

- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and Ethernet cables.

MAN (Metropolitan Area Network)

- A metropolitan area network is a network that covers a larger geographic area that is spread over an area as big as a city by interconnecting different LAN to form a larger network through a telephone exchange line.
- Government agencies use MAN to connect to the citizens and private industries.
- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
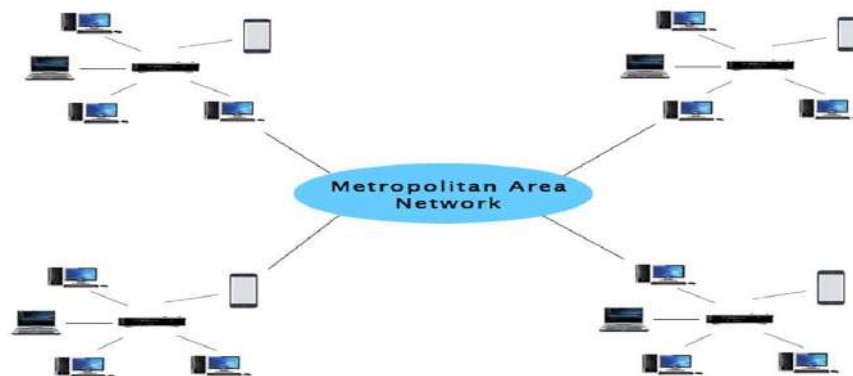
Uses of Metropolitan Area Network:

- MAN is used in communication between the banks in a city.
- It can be used in an Airline Reservation.
- It can be used in a college within a city.
- It can also be used for communication in the military.

WAN (Wide Area Network)

- A Wide Area Network is a network that extends over a large geographical area such as states or countries through a telephone line, fiber optic cable or satellite links.
- The internet is one of the biggest WAN in the world.
- A Wide Area Network is widely used in the field of Business, government, and education.
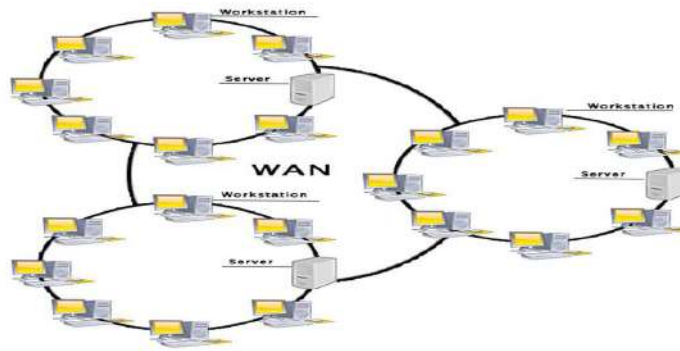
Advantages of Wide Area Network:

Following are the advantages of the Wide Area Network:

- Geographical area: A Wide Area Network provides a large geographical area. Suppose if the branch of our office is in a different city then we can connect with them through WAN. The internet provides a leased line through which we can connect with another branch.
- Centralized data: In case of WAN network, data is centralized. Therefore, we do not need to buy the emails, files or back up servers.
- Get updated files: Software companies work on the live server. Therefore, the programmers get the updated files within seconds.
- Exchange messages: In a WAN network, messages are transmitted fast. The web application like Facebook, WhatsApp, Skype allows you to communicate with friends.
- Sharing of software and resources: In WAN network, we can share the software and other resources like a hard drive, RAM.
- Global business: We can do the business over the internet globally.
- High bandwidth: If we use the leased lines for our company then this gives the high bandwidth. The high bandwidth increases the data transfer rate which in turn increases the productivity of our company.

Disadvantages of Wide Area Network:

- Security issue: A WAN network has many security issues as compared to LAN and MAN network as all the technologies are combined together that creates the security problem.
- Needs Firewall & antivirus software: The data is transferred on the internet which can be changed or hacked by the hackers, so the firewall needs to be used. Some people can inject the virus in our system so antivirus is needed to protect from such a virus.
- High Setup cost: An installation cost of the WAN network is high as it involves the purchasing of routers, switches.
- Troubleshooting problems: It covers a large area so fixing the problem is difficult.

NETWORK PROTOCOL:

A protocol means the rules that are applicable for a network. Protocols defines standardized formats for data packets, techniques for detecting and correcting errors etc.

TCP/IP (Transmission Control Protocol/ Internet Protocol

- It is a set of standardized rules that uses a client-server model of communication in which a user or machine (a client) requests a service by a server in the network.
- The IP protocol ensures that each computer or node connected to the Internet is assigned an IP address, which is used to identify each node independently.
- TCP ensures that the message or data is broken into smaller chunks, called IP packets. Each of these packets are routed (transmitted) through the Internet, along a path from one router to the next, until it reaches the specified destination. TCP guarantees the delivery of packets on the designated IP address. It is also responsible for ordering the packets so that they are delivered in sequence.

FTP (File Transfer Protocol)

- It is a standard internet protocol provided by TCP/IP used for transmitting the files from one host to another. It is mainly used for transferring the web page files from their creator to the computer that acts as a server for other computers on the internet. It is also used for downloading the files to computer from other servers.

Objectives of FTP
- It provides the sharing of files.
- It is used to encourage the use of remote computers.
- It transfers the data more reliably and efficiently.

SMTP (Simple Mail Transfer Protocol.)

- SMTP is a set of communication guidelines that allow software to transmit an electronic mail over the internet is called Simple Mail Transfer Protocol.
- It is a program used for sending messages to other computer users based on e-mail addresses.It provides a mail exchange between users on the same or different computers, and it also supports:
I. It can send a single message to one or more recipients.
II. Sending message can include text, voice, video or graphics.
III. It can also send the messages on networks outside the internet.
- The main purpose of SMTP is used to set up communication rules between servers. They also have a way of handling the errors such as incorrect email address. For example, if the recipient address is wrong, then receiving server reply with an error message of some kind.

Point-to-Point Protocol (PPP) is protocol that is used to connect one computer system to another. Computers use PPP to communicate over the telephone network or the Internet. A PPP connection exists when two systems physically connect through a telephone line. You can use PPP to connect one system to another. For example, an established PPP connection between a branch office and a central office allows either office to transfer data to the other through the network.

POP3 Protocol

Post Office Protocol version 3 (POP3) is a standard mail protocol used to receive emails from a remote server to a local email client. POP3 allows you to download email messages on your local computer and read them even when you are offline.

How is mail transmitted?
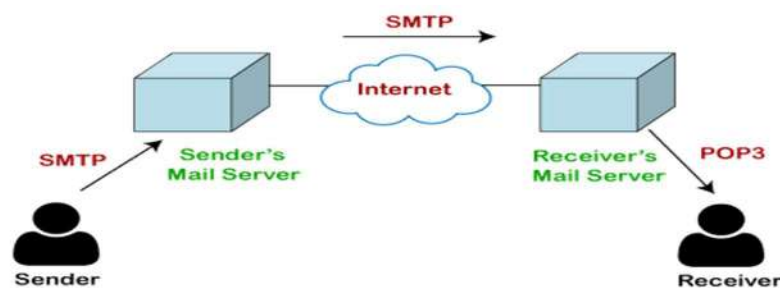
Telnet

- The main task of the internet is to provide services to users. For example, users want to run different application programs at the remote site and transfers a result to the local site. This requires a client-server program such as FTP, SMTP. But this would not allow us to create a specific program for each demand.

- The better solution is to provide a general client-server program that lets the user access any application program on a remote computer. Therefore, a program that allows a user to log on to a remote computer. A popular client-server program Telnet is used to meet such demands. Telnet is an abbreviation for Terminal Network.

- Telnet provides a connection to the remote computer in such a way that a local terminal appears to be at the remote side.

There are two types of login:

Local Login- When a user logs into a local computer, then it is known as local login.

Remote logi- When the user wants to access an application program on a remote computer, then the user must perform remote login.

VoIP :

VoIP stands for **Voice over Internet Protocol**. It is also referred to as IP telephony, internet telephony, or internet calling. It's an alternative to a public switched telephone network (PSTN).

Introduction to Web Services

Everyone is using internet irrespective of their background & interest. The types of services available on internet are as diverse as the interest of the people. Web Services means the services provided by World Wide Web. The World Wide Web provides services like chatting, emailing, video conferencing, e-learning, e-shopping, e-reservation, e-groups and social networking. These services may mean different things to different people but in simple words, they are the ways to communicate and here the communication takes place between two electronic devices.

World Wide Web (WWW)

The World Wide Web commonly referred to as WWW, W3, or the Web is an interconnected system of public webpages accessible through the Internet.
The Web is not the same as the Internet: the Web is one of many applications built on top of the Internet.It's invented by Tim Berners-Lee in 1989. Since that time, the Web has changed the world. It has perhaps become the most powerful communication medium the world has ever known.

Major components of WWW are,

1. Web Server – It is a computer that stores website resources (web pages, images, videos, etc.).
2. Web Browser (Client) - A software application used to access the web resources.
3. Webpage - Hypertext documents formatted in Hypertext Mark-up Language (HTML)   and displayed in a web browser.
4. Website - A website is a collection of inter-linked web pages that is identified by a common domain name (website name) and stored on a web server.
5. HTTP Protocol - It governs data (web page) transfer between a server and a client.
6. HTML- A mark-up language used to specify the structure of a webpage.
7. URL- Address used to identify documents and other web resources on the internet.

Web Architecture

Web is working based on a client-server architecture.
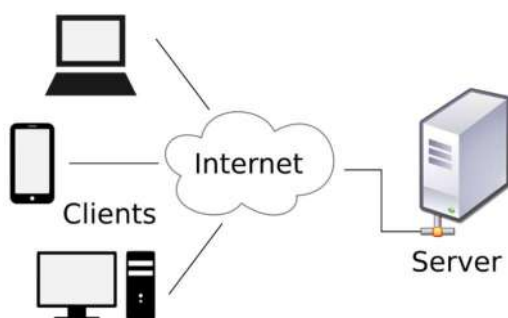
Client: It is a computer capable of requesting, receiving & displaying information in the form of web pages or using a particular service from the service providers (Servers). It's also called as web browsers.

Servers: It is a remote computer which provides/transfers information to the client (in the form of web pages) or access to particular services.
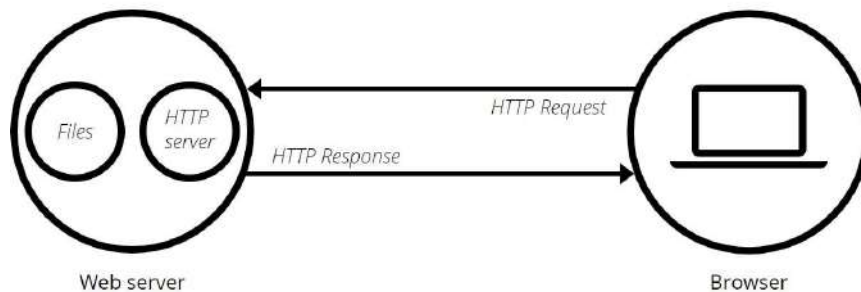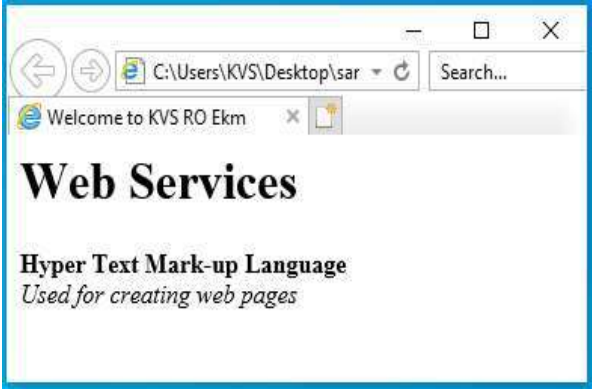
So, it's basically the Client requesting web pages and the Server serving it as long as the requested content is available in the server. i.e. a request-response model.

Difference between Internet and WWW

Internet	World Wide Web(WWW)
Internet stands for Interconnected Networks	WWW stands for World wide Web
Internet is a means of connecting a computer to any other computer anywhere in the world.	World Wide Web which is a collection of information which is accessed via the Internet.
Internet is infrastructure.	WWW is service on top of that infrastructure.
Internet is primarily hardware-based.	WWW is more software-oriented as compared to the Internet.
Internet uses TCP/IP protocol.	WWW uses HTTP Protocol.

HTML (Hypertext Mark-up Language)

- It is not a programming language. It is a mark-up language that tells web browsers how to structure the web pages you visit.
- HTML is language the helps in creating and designing web content.
- It has a variety of tags and attributes for defining the layout and structure of the web document.
- It is designed to display the data in formatted manner.
- A HTML document has the extension .htm or .html.
- Hypertext is a text which is linked to another document.

HTML Code	As Rendered in the Browser
<html> <head> <title> Welcome to KVS RO Ekm </title> </head> <body> Web Services Hyper Text Mark-up Language <i>Used for creating web pages</i> </body> </html>	**Web Services** **Hyper Text Mark-up Language** *Used for creating web pages*

XML (eXtensible Mark-up Language)

- XML is a mark-up language like HTML.
- It is designed to transport or store data.
- In contrast to HTML, it's used to transport the data and not for displaying the data.
- Unlike HTML, it does not have predefined tags.
- It is possible to define new tags in XML.
- It allows the programmer to use customized tags.
- XML is case sensitive.
- A XML document has the extension .xml.

HTML v/s XML

HTML	XML
HTML stands for Hyper Text Mark-up Language	XML stands for eXtensible Mark-up Language
HTML is a case <u>insensitive</u>.	XML is case sensitive.
Predefined tags (commands).	User defined tags (commands).
It is used for presentation of the Data.	It is used for transportation of the Data.
Small errors can be ignored.	Errors not allowed.
Closing tags are optional.	Compulsory to use closing tags.

HTTP - Hyper Text Transfer Protocol

- HTTP is used to transfer data across the web. HTTP specifies how to transfer hypertext (linked web documents) between two computers.
- It allow users of the World Wide Web to exchange information found on web pages.
- When accessing any web page entering http:// in front of the address tells the browser to communicate over HTTP.
- A Protocol is a set of rules for communication between two computers. HTTP is a textual, stateless protocol.
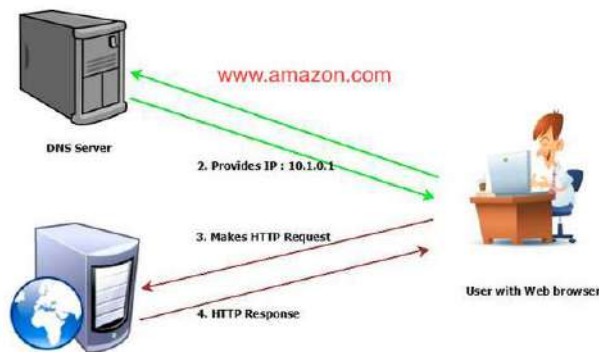
- Clients (web browsers) send requests through request object of http to web servers for web pages, resources etc.
- Web server respond accordingly through response object of http.
- After this cycle (request – response), the connection between client and server across the Internet is disconnected.
- A new connection must be made for each request (means for each web page).
- Hypertext Transfer Protocol Secure (HTTPS) is an extension of the HTTP.
- It is used for secure communication over a computer network.
- In HTTPS, the communication protocol is encrypted using Transport Layer Security (TLS).
- HTTPS provides,
  1) Encryption: Encrypting the exchanged data to keep it secure from eavesdroppers.
  2) Data integrity: Data cannot be modified or corrupted during transfer.
  3) Authentication: Proves that your users communicate with the intended website.
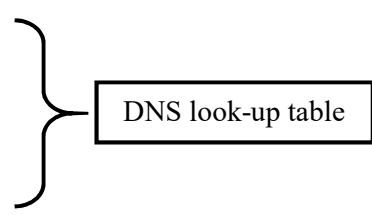
Domain Names

- The Internet is a vast ocean where information is available in the form of millions of websites.
- Each website is stored on a server which is connected to the Internet, which means each server has an IP address. Every device connected to the Internet has an IP address.
- To access a website, we need to enter its IP address on our web browser.

- But it is very difficult to remember the IP addresses of different websites as they are in terms of numbers or strings.
- However, it is easier to remember names, and therefore, each computer server hosting a website or web resource is given a name against its IP address. These names are called the Domain names or hostnames corresponding to unique IP addresses assigned to each server.
- For easy understanding, it can be considered as the phonebook where instead of remembering each person's phone number, we assign names to their numbers.

For example, IP addresses and domain names of some websites are as follows:

Domain Name	IP Address
ncert.nic.in	164.100.60.233
cbse.nic.in	164.100.107.32
kvsangathan.nic.in	164.100.166.91
wikipedia.org	198.35.26.96

DNS look-up table

- The process of converting a hostname (such as www.google.com) into the corresponding IP address (such as 172.217.14.196) is called domain name resolution.
- Specialized DNS servers are used for domain name resolution (DNS resolution), so whenever you type some web address (domain name) on the address bar of a web browser, it will be translated into an equivalent IP address with the help of one or more DNS servers including local DNS cache.

URL-Uniform Resource Locator
- Every web page that is displayed on the Internet has a specific address associated with it, this address is known as the URL.
- Like postal address is required to reach a letter to a person staying anywhere on earth.
   The URL consists of four basic parts, namely, server type, hostname, folder name and the filename. Each one of these has a specific function.
   1) The "server type" indicates the type of Internet server (Protocol) being accessed. The server type is always followed by "://" and the host name.
   2) The host name/domain name is the Internet address of a remote computer on which the files reside.
   3) The folder name indicates the name of the directory in which the files are located.
   4) The filename specifies the name of the specific document to be displayed in the browser. The filename itself consists of two pieces of information, the name of the file to be displayed and the file extension, which specifies the file type (.htm for HTML file, .txt for a text file, .bmp for a bitmap image, etc.)

The structure of a URL can be represented as follows:

Server type://hostname/directory/sub-directory/.../filename

A URL is illustrated in below figure.
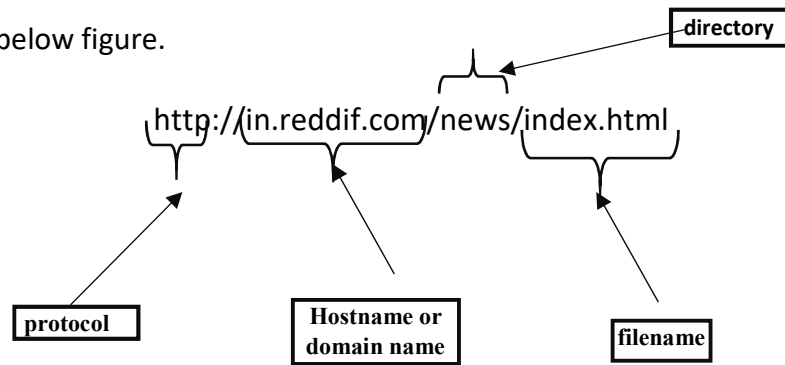
Websites

- A website is a collection of linked web pages (plus their associated resources) that share a unique domain name.
- Thus, a Web site is a collection of related Web pages.
- Each web page of a given website provides explicit links, most of the time in the form of clickable portion of text, that allow the user to move from one page of the website to another.
- Each Web site is owned and updated by an individual, company, or an organization.
- Web is a dynamically moving and changing entity, today web sites generally change on a daily or even hourly basis.
- To access a website, type its domain name in your browser address bar, and the browser will display the website's main web page, or homepage (casually referred as "the home")

Web page
- Web page is an electronic document designed using HTML.
- It displays information in textual or graphical form.
- It may also contain downloadable data files, audio files or video files.
- Traversal from one webpage to another web page is possible through hyperlinks.

Difference between Webpage and Website
A web page is one single page of information, while a website is made up of a number of related web pages inter-connected by links known as hyperlinks.

Web Browser
- Web browser is software program to navigate the web pages on the internet.
- A bowser interprets the coding language of the web page and displays it in graphic form.
- A web browser allows anyone to access the web without even knowing commands used in software languages to design a web page.
- Internet works on client -server model.
- A web browser is a client which requests the information from the web server.
- The web server sends the information back to the client.

- The web address of the webpage written on the address bar tells the web browser which page to access.
- The most popular web browsers are: Google Chrome, Mozilla Firefox, Internet Explorer, Safari, Opera, Netscape and UC Browser.

What is a cookie?

- A cookie is information stored on your computer by a website you visit.
- Cookies often store your settings for a website, such as your preferred language or location.
- When you return to the site, browser sends back the cookies that belong to the site.
- This allows the site to present you with information customized to fit your needs.
- Cookies can store a wide range of information, including personally identifiable information (such as your name, home address, email address, or telephone number).
- However, this information can only be stored if you provide it - websites cannot gain access to information you didn't provide to them, and they can't access other files on your computer.

Web Server

- A *web server* is a computer or a group of computers hosting one or more *websites.*
- "Hosting" means that all the *web pages* and their supporting files are available on that computer.
- The *web server* will send any *web page* from the *website* it is hosting to any user's browser, per user request.
- More importantly, since a web server can host multiple websites, the term *web server* is never used to designate a website, as it could cause great confusion.
- It works on client/server model.
- It delivers the requested web page to web browser.
- Web servers use special programs such as Apache or IIS to deliver web pages over the http Protocol
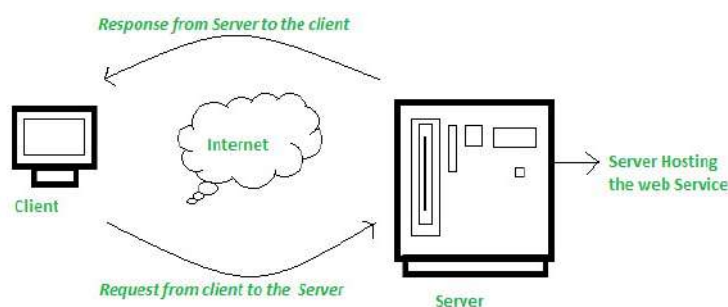
Web Hosting

- Web hosting is the process of uploading/saving the web content on a web server to make it available on WWW.
- In case an individual or a company wants to make its website available on the internet, it should be hosted on a web server.
- A good way to think about this is if the domain name is the address of our house, then web hosting is the actual house that address points to. All websites on the internet, need web hosting.
- Domain names and web hosting are two different services. However, they work together to make websites possible. It is possible with the system known as DNS.

Model Questions

I. Multiple Choice Questions

1.Which one of the following devices will you suggest for connecting all the computers within each block of a building?

        a. Switch/Hub   b. Modem

        c. Telephone   d. Repeateri

2. XYZ company is planning to link its head office situated in New Delhi with the offices in hilly areas. Suggest a way to connect it economically:

        a. Micro waves   b. Coaxial cable

        c. Fibre optic   d. Radio waves

3. Which of the following is/are not communication media?

        a. Microwaves   b. Optical Fiber cable

        c. Node   d. Radio waves

4 . The _____ is over which the messages are sent.

    a. Signal   b. Channel   c. Protocol   d. Sender

5. Which of the following is not a unit of data transfer rate?

    a. Abps   b. Bps   c. Kbps   d. Gbps

6. The number of bits transmitted per second is called _____.

    a. Bit rate   b. Baud rate   c. Data rate   d. Transfer rate

7. The messages sent over a network is divided into small pieces called _____.

    a. Units   b. Chunks   c. Packets   d. Bits

8. A _____ is established in circuit switching before actual communication.

a. Switch   b. Link   c. Protocol   d. Hub

9. The _____ is the difference between upper and lower frequencies of a communication medium.

a. Bandwidth   b. Data rate   c. Latency   d. communication speed

10. The unit of Bandwidth is?

a. Khz   b. Hz   c. Watt   d. KW

11. For every device connected to a network, there will be a unique _____.

a. Name   b. ID   c. IP Address   d. IC

12. Raw data is processed to get _____.

a. File   b. Information   c. Communication   d. Message

13. Which of the following is/are true regarding packet switching?

1. The packets of data are sent simultaneously through different paths.

2. The free communication channel is utilized properly.

3. Protocols are used for the reliable receipt of data at the receiver end.

4. Sequence numbers are assigned to the data packets.

a. Only 1   b. Both 1 & 4   c. Both 2 & 4   d. All of the above.

14. _____ is applicable in the case of long voice data communication.

a. Protocols   b. Circuit Switching   c. Packet Switching   d. None of these.

15. Which of the following is/are true in the case of IP address?

1. IP address can be used to trace the actual physical location of a device in the network.

2. A printer connected to a network will also have an IP Address.

3. Two devices can have same IP Address.

4. The IP Address can be formed of any number.

a. Only 1 is true   b. Only 1 & 2 are true   c. Options 1, 2 and 4 are true.   d. All the options are true.

16. Selecting a communication path among multiple available paths is termed as:

a. Transmission   b. Reception   c. Switching   d. multiplexing

17. The other name for communication medium is:

a. Channel   b. Source   c. Hub   d. Switch

18.

| Establishing a Connection | → | Communication | → | Terminating Connection |

The above procedure occurs in the case of _____.

    a. Packet Switching   b. Circuit Switching

    c. Both a and b   d. None of these.

19. What are the three common types of computer networks?

    a. ROM, MAN, LAN   b. RAM, WAN, LAN

    c. MAN, LAN, WAN   d. None of the above

20. What is the acronym for LAN?

    a. Local Area Network   b. Local Access Network

    c. Line And Networking   d. Line-less Networking

21. Define what a LAN is?

    a. Connected devices share the resources of a single processor or server within a small geographic area

    b. Normally find within a business and school

    c. These are computers that share resources over a large area

    d. None of the above

22. Mr. John is a small businessman who runs Hardware. He has been experiencing problems with his small accounting department, which he depends on to provide sales reports. Mr. John wants to share information between his 7 computer stations and have one central printing area. What type of network would you recommend to Mr. John?

    a. MAN   b. LAN

    c. WAN   d. SAN

23. WAN covers a larger geographical area than MAN?

    a. True   b. False

24. A network that consists of both LANs and MANs is called a Wide area network?

    a. True   b. False

25. Arrange the Following Types of Networks according to their size, from largest to smallest?

a. LAN, WAN, MAN   b. WAN, LAN, MAN

c. MAN, LAN, WAN   d. WAN, MAN, LAN

26. You are a member of a club that deals with computer networks. The club has to take a project to build a MAN. Where would this project likely take place?

a. A small building/organization   b. University or college

c. Home   d. None of the above

27. What is the acronym MAN stand for?

a. Magnetic Access Network   b. Metropolitan Area Network

c. Multi-Area Network   d.. Multi-Access net

28. In your school there is a library, and you can use the internet to do research, this library will most likely be a WAN network?

a. True   b. False

29. Types of Networks are Categories by their Geographical Area cover?

a. True   b. False

30. Metropolitan Area Network Normally Require an Internet connection?

a. True   b. False

31. What's a web browser?

a) A kind of spider

b) A computer that store www files

c) A person who likes to look at websites

d) A software program that allows you to access sites on the World Wide Web

32. A _____ is a document commonly written and is accessible through the internet or other network using a browser?

a) Accounts   b) Data

c) Web page   d) Search engine

33. Which of the following is used to read HTML code and to render Webpage?

a) Web Server   b) Web Browser

c) Web Matrix   d) Weboni

34. Which of these tech company owns Firefox web browser?

a) Lenovo   b) IBM

c) Apple   d) Mozilla

35. Which of the following browsers were/are available for the Macintosh?

    a) Opera   b) Safari

    c) Netscape   d) All of these

36. What is the name of the browser developed and released by Google?

    a) Chrome   b) Googly

    c) Heetson   d) Titanium

37. Which of the following is a Web Browser?

    a) MS-office   b) Notepad   c) Firefox   d) Word 2007

38. Which of the following is not a web browser?

    a) Chrome   b) Microsoft Edge   c) Safari   d) Ubuntu

39. URL stands for

    (a) Uniform Research Limited   (b) Uniform Resource Locator

    (c) Uniform Resource Labs   (d) Uniform Research Locator

40. LinkedIn is an example for _____ website.

    (a) E-learning   (b) E-commerce

    (c) Video conferencing   (d) Social networking

41. Which of the following is not a web service?

    (a) Distance Learning   (b) E-mailing

    (c) Video conferencing   (d) Social networking

42. Web browsers are also called as _____

    (a) Web Servers   (b) Web Clients   (c) Web Hosting (d) Web Designing

43. Working of WWW based on _____ architecture.

    (a) Peer-To-Peer architecture   (b) Client-Client architecture

    (c) Client-Server architecture   (d) Server-Server architecture

44. _____ is a computer software capable of requesting, receiving & displaying information in the form of webpages.

    (a) Web Servers   (b) Web Browsers

    (c) Web Designers   (d) Web Camera

45. A _____ is a program or automated script which browses the World Wide Web in a methodical, automated manner.

(a) Web Servers   (b) Web Browsers

(c) Web Designers   (d) Web Crawler

46_____ is a mark-up language that helps in developing web pages.

(a) HTTP   (b) HTML   (c) XML   (d) C++

47 _____ is a language used to transport data over internet.

(a) HTTP   (b) HTML   (c) XML   (d) C++

48._____ is a set of rules for communication between two computers over a network.

(a) Modem   (b) Protocol

(c) Switch   (d) IP address

49.In web services, the communication takes place between

(a) Two electronic devices   (b) Two human beings

(c) Two spiders   (d) None of the above

50.Web services means services provided by _____

(a) Microsoft   (b) Google

(c) BSNL   (d) World Wide Web

II. Very Short Answer Type Questions(1-mark)

1. Give examples for Wired media and Wireless media.

2. Name the device which connects multiple nodes to form a network. It redirects the received information only to the intended node(s).

3. Identify odd one out of the following:

Optical Fiber/Coaxial Cable/ Bluetooth/Twisted Pair Cable. Give reason for your answer.

4. Ms. Emily is planning to connect 20 computers in her computer lab to form a local area network. Suggest an intelligent network device to connect all the computers.

5. Which communication channel is/are suitable in each of the following situations?

    (i)   Transfer of data from one mobile to another.

    (ii)   Communication in a hilly area.

6. Tagore Consultancy is planning to link its head office at Kolkata with the offices at Ernakulam. Suggest an economic way to set up a connection between these offices. The company is ready to compromise on the speed of the connectivity.

7. Mr. Roy, General Manager of Infopark Solutions discovered that the communication between his company's main office and HR office is extremely slow and signals drop quite frequently. These offices are 150 meters away from each other and connected by an Ethernet cable. Suggest him a device which can be installed between the offices for smooth communication.

8. Name The transmission media best suitable for connecting to hilly areas.

9. How many pair of wires are there in twisted pair cable (Ethernet)?

10. Name a device that forwards data packets along networks.

11. What is the full form of WWW?

12. What is the full form of Internet?

13. Who invented the WWW in 1989?

14. Special software's that is used to view webpages are _____

15. _____ are used to store webpages, so whenever a request, it will serve the request.

16._____ are programs /computers used to store information's in the form of webpages.

17. Web pages that are linked to each other via _____

18. _____ protocol is used to transfer web pages over internet.

19. Full form of HTTP?

20._____ is a massive collection of digital pages to access information over the Internet

21. Write any 2 differences between HTML & XML?

22._____ is a real-time communication between two or more users via computer.

23._____ helps us to learn anywhere using Internet.

24._____ allows customers to conduct financial transactions on a secure Website.

25. Internet can be used to get reservation of trains and air planes through _____ service.

26. _____ helps to create and maintain social relationship over web.

27. Expand the following abbreviations:

      a. HTTP

      b. XML

      c. HTTPS

d. HTML

e. VoIP

28. Name any two common web browsers.

29. Full form of Email is _____

30. What out of the following, you will use to have an audio visual chat with an expert sitting in a faraway place to fix-up technical issues?

    (i) E-mail   (ii) VoIP   (iii) FTP

31. Match the following

Web Services		Description	
A	Video conferencing	P	Without ever having to go booking office
B	E-Shopping	Q	Self-paced learning modules allow students to work at their own speed
C	E-mail	R	Each of the end user has a camera as well as microphone to capture video and audio in real time and it will be transmitted over internet
D	E-reservation	S	Purchasing products through computers/mobile devices
E	E-learning	T	Messages normally reaches a recipients account within seconds

32. Match the following

Web Services		Applications	
A	Video conferencing	P	IRCTC
B	E-Shopping	Q	Diksha App
C	E-mail	R	GEM
D	E-reservation	S	Gmail
E	E-learning	T	Instagram
F	Social Networking	U	VConSol

III.Short Answer Type (Theory with Answers)

1. Your friend wishes to install a wireless network in his office. Explain him the difference between guided and unguided media.

   Guided media uses cables to connect computers, whereas unguided media uses waves

2. What are Protocols? Name the protocol used to transfer a file from one device to the other.

   Protocols are set of rules that are followed while transmitting data through a computer network. Protocols determines how to data can be moved securely from a source device to a destination device. The protocol used for transferring a file from one device to another is the File Transfer Protocol (FTP)

3. Define communication channel.

   A communication channel is the medium through which data is moved from the source to destination. The communication channel can be either wired or wireless. Wired communication channel is also called guided medium while wireless communication channel is also called unguided medium.

4. What do you mean by an IP Address? Give an example for IP Address.

   An IP Address is a numerical address that uniquely identifies every device connected to a network or internet. The user's physical location can be tracked by using an IP Address. IP V4 (IP Version 4) is a popular version of IP Address. IP Address (in IP V4) consists of four set of numbers separated by a dot. These numbers can range from 0 to 255.

   An example IP Address format is given below:
   192.158.12.38

5. Differentiate between Circuit Switching and Packet Switching.

   In Circuit Switching a physical connection between the sender and the receiver is set up first. Then, through that physical link, the complete message is communicated continuously. After completion of the transmission, the physical connection is terminated.

   In Packet Switching, the message is split into small units called packets. Then these packets are passed from source to destination simultaneously through different routes in the network. As the flow of packets are asynchronous, sequence numbers are assigned to each packet to facilitate re-ordering of packets at the destination.

6. Define the following: a. Bandwidth b. Data rate

   Bandwidth: It is the range of frequencies that can be carried through a communication channel. The bandwidth of a channel determines its capacity. It is the difference between the highest and lowest frequencies that can be carried through the channel. The unit of Bandwidth is Hertz (Hz).

Data transfer rate: It is the amount of data moved through a communication channel per unit time. The   units of Data transfer rate are Bits per second (Bps), Kilobits per second (Kbps) , Megabits per second (Mbps) or Gigabits per second (Gbps).

7.   Explain the components of data communication.
The components of data communication are: Sender, Receiver, Message, Communication Medium and Protocols.
Sender: The device which sends data through a network is called sender or source.
    Receiver: The device which receives data through a network is called receiver or destination.
    Message: The data that is communicated between the source and the destination is called message.
    Communication channel: The medium through which the data is carried from the source to   destination is called a communication medium.
    Protocols: The set of rules followed while communicating data over a network are called Protocols.

8.   What are the advantages of Packet switching over Circuit switching.
In Packet Switching the communication channel is utilized completely whenever it is free. Where as in Circuit Switching, once the connection is assigned for a particular communication, the entire channel cannot be used for other data transmissions even if the channel is free.
Data packets moves simultaneously through different paths in a Packet Switched network, making the transmission quick and easy. But in the case of Circuit Switched network, there is a delay in setting up a physical connection between the source and destination before communicating the actual message.
Packet Switching is cost effective compared to Circuit Switching as there is no need to set up a connection between the communicating parties every time before the actual communication.

9.   Explain why Circuit Switching is not cost effective compared to Packet Switching?
The Circuit Switching is not cost effective like Packet Switching because, in Circuit Switching, every time there is a need to set up a connection between the sender and the receiver before communicating the message.

10. Explain how an IP Address become helpful in investigating cyber-crimes.

IP address can be used to trace the physical location of a user connected to a network. By this many cyber crime can be investigated and traced out efficiently tracking the exact location from where the cybercrime is carried out.

11. Why Protocols are needed in the case of Data Communication?

The communicating devices may be in different geographical areas. The speed of these devices may be different. Also, the data transfer rates of different networks may be different. These complexities make it necessary to have a common set of rules i.e., Protocols to ensure the secure communication of data

12. What is the difference between World Wide Web & Internet?

Internet means interconnected networks that spread all over the world (i.e. the physical infrastructure), while WWW means the information's (available in the form of webpages) that can be accessed through internet.

13. What is a protocol, give some examples?

Protocols are set of rules that are followed while transmitting data through a computer network. Protocols determines how to data can be moved securely from a source device to a destination device. The protocol used for transferring a file from one device to another is the File Transfer Protocol (FTP)

14. What is the difference between E-mail and chat?

In order to chat, you need to have an account on the same service as the person you are chatting with. e.g. on the other hand, in case of E-mail, it is not necessary, i.e. you can have an account from any provider and you can establish your own.

15. What are cookies?

Cookies are files stored temporarily on www browser's computer, which allow the www server to store persistent information associated with browsing user on user's system.

16. What is the difference between domain name and IP address?

IP addresses look like this: 192.168.12.134.

Domain names look like this: "www.google.com"

Domain names are easier for us to remember and use, while computers are quite handy with numbers. Thus, we use DNS (Domain Naming System) to translate domain names into the IP addresses.

IP address is a unique identifier for a computer or device on internet. A domain name (website name) is a name that identifies one or more IP addresses (when hosted at different servers for load balancing).

17. Give one suitable example of each URL and domain name?

    URL: https://kvsangathan.nic.in/hq-gyan-kosh

    Domain name: kvsangathan.nic.in

18. Differentiate between XML and HTML.

    XML was designed to describe data and to focus on what data is.

    HTML was designed to display data and to focus on how data looks.

    HTML is about displaying information while XML is about describing information.

19. Distinguish between website and web browser.

    Website:- It is a collection of inter-linked web pages stored in a server.

    Web Browser:- It is a software application for retrieving, presenting and traversing through information resources in the form of web pages available on the World Wide Web.

20. Differentiate between the terms Domain Name and URL in context of web services. Also write one example of each to illustrate the difference.

Domain Name	URL
A domain name or website name is a human-friendly text form of the IP address.	URL is a string that represents the complete web address of any web page. It's used to locate a webpage.
It is the part of the URL that is more human friendly.	It is the string that represents a complete web address that contains the domain name.
Example: kvsangathan.nic.in	Example: https://kvsangathan.nic.in/contact-us

22. Differentiate between communication using Optical Fiber and Ethernet Cable in context of wired medium of communication technologies.

    Optical Fibre - Very Fast - Expensive - Immune to electromagnetic interference

    Ethernet Cable - - Slower as compared to Optical Fiber - Less Expensive as compared to Optical Fiber - prone to electromagnetic interference

IV. Previous CBSE Board Questions

1) Ravi was trying to log-in to his internet-banking account. He noticed that the URL of the net banking starts with 'https'. The 's' in 'https' stands for _____

   (i) Simple   0(ii) Smart   (iii) Secure   (iv) Strength

2) What is mean by the homepage of a website?

3) What is the significance of the URL?

4) Which of the following is not a network protocol?
(i) HTML   (ii) HTTP (iii) SMTP   (iv) FTP

5) Which of the following internet protocols provides secure data transmission between server and browser with the help of encryption.
 a) HTTP   b) HTTPS   c) TELNET   d) ARPANET

6) Devanand, a student of Class XII, is not able to understand the difference between web client and web-server. Help him in understanding the same by explaining their role and giving suitable example of each.

7) Write the full form of Cc and Bcc (used in email communication). Explain the difference between them.

8) Define Internet and write its two uses in our daily life. How is it different from the World Wide Web (WWW).

9) Web _____ is a software used to view web pages.

10) In a network, _____ is a computer that provides data and resources to other computers.

11) How is a website and a webpage related?

12) Microsoft Edge, Apple Safari are examples for _____

13) What is the use of a server in a computer network?

14) Among the following service available on the World Wide Web are?
    i) Email   ii) HTML   iii) XML   iv) Video conferencing
    (a) (i) and (ii)   (b) (i) and (iv)
    (c) (ii) and (iii)   (d) None of the above
15) HTML and XML are _____
    (a) Programming Languages   (b) Scripting Languages
    (c) Mark-up Languages   (d) None of the above
16) XML uses _____
    (a) User defined tags   (b) Predefined Tags
    (c) Both user defined and predefined tags (d) None of the above

17) XML was not designed to _____

    (a) store the data   (b) present the data

    (c) carry the data   (d) both a & c

18) Which of the following will you suggest to establish the online face to face communication between the people in the Regional Office Ernakulum and Delhi Headquarter?

    (a) Cable TV   (b) Email

    (c) Text chat   (d) Video Conferencing

19) What kind of data gets stored in cookies and how is it useful?

20) What do the following top level domains signify?

    (a) .com

    (b) .org

21) "With XML you invent your own tags", Explain this statement with the help of example.

22) Define Domain Name Resolution?

23) _____ tags are case sensitive and _____ tags are not case sensitive.

    (a) HTML, XML   (b) HTTP, XML

    (c) XML, HTTP   (d) XML,HTML

24) Which of the following is not a web browser ?

    (a) Google Chrome   (b) Internet Explorer   (c) Mozilla Firefox   (d) Photoshop

25) Which protocol helps us to browse through web pages using internet browsers?

26) Name any one internet browser.

27) XML stands for

    (A) Xtra Markup Language

    (B) Extensible Markup Language

    (C) Extensible Marking Language

    (D) Extensive Marked Language

28) We can upload a file to a web server using a protocol called _____.

    (A) FPT   (B) IP   (C) TCP   (D) FTP

29) _____ delivers the requested web page to web browser.

30) . MyPace University is setting up its academic blocks at Naya Raipurand is planning to set up a network. The University has 3 academicblocks and one Human Resource Center as shown in the diagram below: Study the following structure and answer questions (a) to (e)
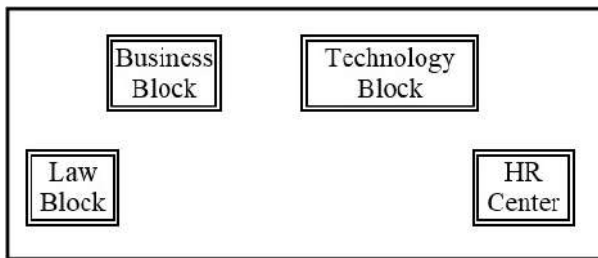
Center to Center distances between various blocks/center is as follows:

Law Block to business Block	40m
Law block to Technology Block	80m
Law Block to HR center	105m
Business Block to technology Block	30m
Business Block to HR Center	35m
Technology block to HR center	15m

Number of computers in each of the blocks/Center is as follows:

Law Block	15
Technology Block	40
HR center	115
Business Block	25

a) Suggest the most suitable place (i.e., Block/Center) to install the server of this University with a suitable reason.

b) Suggest an ideal layout for connecting these blocks/centers for a wired connectivity.

c) Which device will you suggest to be placed/installed in each of these blocks/centers to efficiently connect all the computers within these blocks/centers?

d) Suggest the placement of a Repeater in the network with justification.

e) The university is planning to connect its admission office in Delhi, which is more than 1250km from university. Which type of network out of LAN, MAN, or WAN will be formed? Justify your answer.

Test Your Self   : PART I

1 Write any 1 advantage and 1 disadvantage of Bus topology.

2. What happens to the Network with Star topology if the following happens:
 (i)   One of the computers on the network fails?

(ii) The central hub or switch to which all computers are connected, fails?

3. Two doctors have connected their mobile phones to transfer a picture file of a person suffering from a skin disease. What type of network is formed?

4. SunRise Pvt. Ltd. is setting up the network in the Ahmadabad. There are four departments named as MrktDept, FunDept, LegalDept, SalesDept.
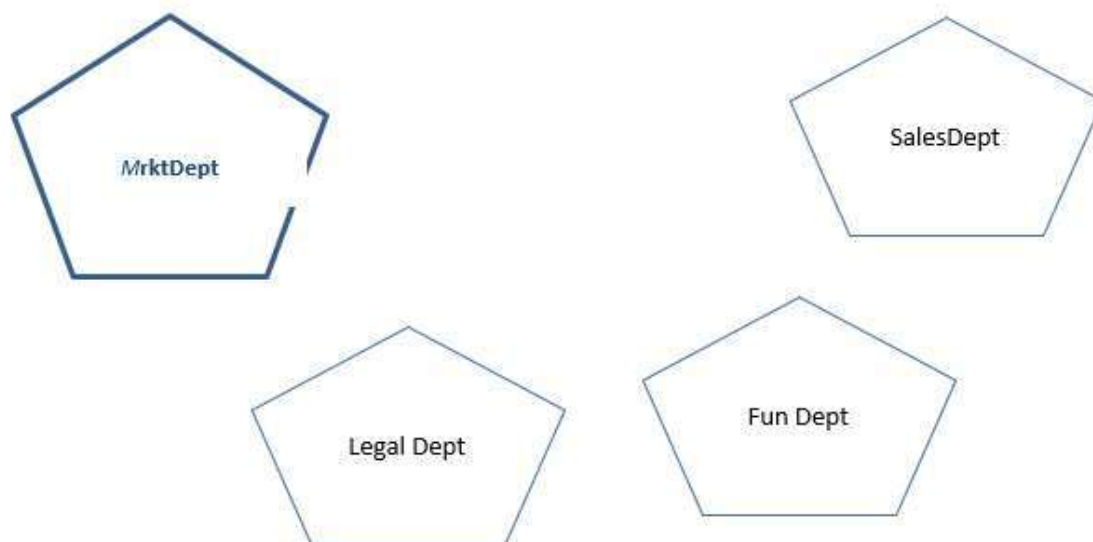
Distance between various buildings is given as follows:

MrktDept to FunDept	80 m
MrktDept to LegalDept	180 m
MrktDept to SalesDept	100 m
LegalDept to SalesDept	150 m
LegalDept to FunDept	100 m
FunDept to SalesDept	50 m

Number of Computers in the buildings

MrktDept	20
LegalDept	10
FunDept	8
SalesDept	42

i)   Suggest a cable layout of connections between the Departments and specify topology.
ii) Suggest the most suitable building to place the server with a suitable reason.
iii) Suggest the placement of i) modem ii) Hub /Switch in the network.
iv) The organization is planning to link its sale counter situated in various part of the same city/ which type of network out of LAN, WAN, MAN will be formed? Justify.

5. Name the protocol Used to transfer voice using packet switched network.
6. What is HTTP?
7. Write the purpose of the following devices:
      (i). Network Interface Card
     (ii). Repeater

Test Your Self   : PART II

1. The 'Grand Plaza ' Mall has a computer network. The network is in one building. Name this type of network(out of LAN/MAN/WAN).

2. Identify the type of topology on the basis of the following:

a. Since every node is directly connected to the server, a large amount of cable is needed which increases the installation cost of the network.

b. It has a single common data path connecting all the nodes

3. The following is a 32 bit binary number usually represented as 4 decimal values, each representing 8 bits, in the range 0 to 255 (known as octets) separated by decimal points.

            192.158.1.38

What is it? What is its importance?

4. Dinsey has to share the data among various computers of his two offices branches situated in the same city. Name the network (out of LAN, WAN, PAN and MAN) which is being formed in this process.

5. . Global   Pvt. Ltd. is setting up the network in the Bangalore . There are four departments

Distances between various buildings are as follows:

Accounts to Research Lab	55 m
Accounts to Store	150 m
Store to Packaging Unit	160 m
Packaging Unit to Research Lab	60 m
Accounts to Packaging Unit	125 m
Store to Research Lab	180 m
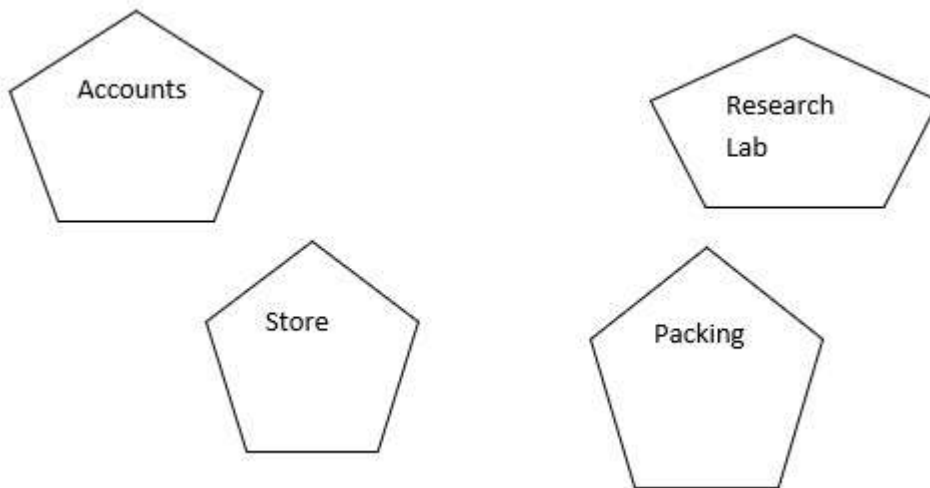
Number of Computers

Accounts	25
Research Lab	100
Store	15
Packaging Unit	60

i) Suggest a cable layout of connections between the buildings.

ii) Suggest the most suitable place (i.e. buildings) to house the server of this organization.

iii) Suggest the placement of the following device with justification:

a) Repeater b) Hub/Switch

6. Write one example each of URL and IP address.

ANSWER KEY

I. Multiple Choice Questions(MCQ)

1.	a	2.	d	3.	c	4.	b	5.	a
6.	a	7.	c	8.	b	9.	a	10.	b
11.	c	12.	b	13.	d	14.	b	15.	c
16.	c	17.	a	18.	b	19.	c	20.	a
21.	a	22.	b	23.	a	24.	a	25.	d
26.	d	27.	b	28.	a	29.	a	30.	a
31.	d	32.	c	33.	b	34.	d	35.	b
36.	a	37.	c	38.	d	39.	b	40.	d
41.	a	42.	b	43.	c	44.	b	45.	d
46.	b	47.	c	48.	b	49.	a	50.	d

II. Very Short Answer Type Questions(1-mark)

1.   Wired media: Optical Fiber cable

Wireless media: Microwaves, Radio waves

2.   Switch

3.   Odd one: Bluetooth(Reason: Bluetooth is a wireless/unguided communication media while others are wired/guided communication media)

4.   Switch

5.   (i) Bluetooth   (ii). Radio waves

6.   Satellite

7.   Repeater

8. Microwave / Radio wave

9. Two insulated copper wires

10. Router

11. World Wide Web

12. Interconnected Networks

13. Tim Berners-Lee

14. Web browsers

15. Web servers

16. Web servers

17. hyperlinks

18. HTTP- HyperText Transfer Protocol

19. HyperText Transfer Protocol

20. World Wide Web(WWW) or Web

21. Refer comparison table

22. Chat

23. E-learning

24. Internet banking

25. E-reservation

26. Social networking websites

27.

    a. HTTP- HyperText Transfer Protocol

    b. XML – eXtensible Mark-up Language

    c. HTTPS - HyperText Transfer Protocol Secure

    d. HTML - HyperText Mark-up Language

    e. VoIP-Voice over Internet Protocol

28. Google Chrome, Mozilla Firefox

29. Electronic mail

30. Ii.VoIP

31.

A	Video conferencing	P	Each of the end user has a camera as well as microphone to capture video and audio in real time and it will be transmitted over internet
B	E-Shopping	Q	Purchasing products through computers/mobile devices
C	E-mail	R	Messages normally reaches a recipients account within seconds
D	E-reservation	S	Without ever having to go booking office
E	E-learning	T	Self-paced learning modules allow students to work at their own speed

32.

Web Services		Applications	
A	Video conferencing	P	VConSol
B	E-Shopping	Q	GEM
C	E-mail	R	Gmail
D	E-reservation	S	IRCTC
E	E-learning	T	Diksha App
F	Social Networking	U	Instagram

IV.Previous CBSE Board Questions - Answers

1. (iii) Secure

2. The default (first) page of a website is called a Homepage.

3. URL specifies unique address of each document on the internet.

4. (i) HTML

Internet Protocols for communication over the Internet, the communicating devices must follow certain rules. These rules are called Internet protocols.

For email communication, we use SMTP and POP.

For communication between browser and server HTTP and HTTPS protocols are used.

We can use TELNET to access services available on a remote computer.

5. b) HTTPS

6. Web-Client: An application that requests for services from a webserver. Example: Web Browsers, Chatting Applications

Web-Server: Web-server is a software (or any dedicated computer running this software) that serves the request made by web-clients. Example: Apache Server.

7. Cc : Carbon Copy: every recipient can check who else has received the mail.

Bcc : Blind Carbon Copy: no recipient can check who else has received the mail.

8.   The Internet is a worldwide network that links many smaller computer-networks.

Uses of the Internet 1. E-learning 2. E-commerce

The difference between the internet and www:

Internet means interconnected networks that spread all over the world (i.e. the physical infrastructure), while WWW means the information's (available in the form of webpages) that can be accessed through internet.

9.   Web Browser

10.   Server

11.   A website is a collection of interlinked webpages.

12.   Web Browsers

13.   Role of server is to serve various clients (sharing data or resources among multiple clients)

14.   (b) (i) and (iv)

15.   (c) Mark-up Languages

16.   (a) User defined tags

17.   (b) present the data

18.   (d) Video Conferencing

19.   Cookies can store a wide range of information, including personally identifiable information (such as your name, home address, email address, or telephone number). Cookies often store your settings for a website, such as your preferred language or location. When you return to the site, browser sends back the cookies that belong to the site. This allows the site to present you with information customized to fit your needs.

20.   (a) .com - commercial

(b) .org - organization

21.   XML tags are created by the user as there are no standard tags.

 Ex : <name>Nayana<name>

22.   The process of converting domain names (website names) into corresponding IP address with the help of DNS servers is called domain name resolution.

23.   (d) XML,HTML

24.   (d) Photoshop

25. HTTP - Hyper Text Transfer Protocol

26. Google Chrome or any other valid browser name

27. (B) Extensible Markup Language

28. (D) FTP

29. Web Server

30 a. Most suitable place to install the server is HR center, as this center has maximum number of computers.

b.
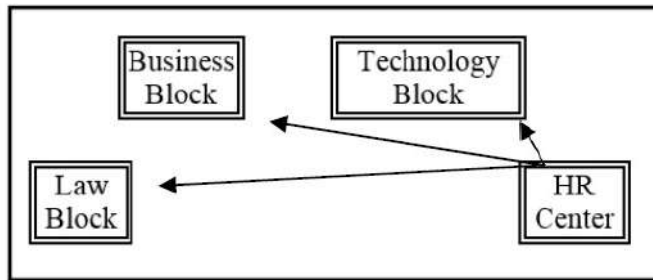
c. Switch

d. Repeater may be placed when the distance between 2 buildings is more than 70 meter.

e. WAN, as the given distance is more than the range of LAN and MAN.

Test Yourself: PART I

1. **Advantage**: Since there is a single common data path connecting all the nodes, the bus topology uses a very short cable length which considerably reduces the installation cost.

Disadvantage: Fault detection and isolation is difficult. This is because control of the network is not centralized in any particular node. If a node is faulty on the bus, detection of fault may have to be performed at many points on the network. The faulty node has then to be rectified at that connection point.

2. (i). failure in one cable will not affect the entire network

(ii). If the central hub or switch goes down, then all the connected nodes will not be able to communicate with each other.

3. PAN

4. i. Star Topology should be used.
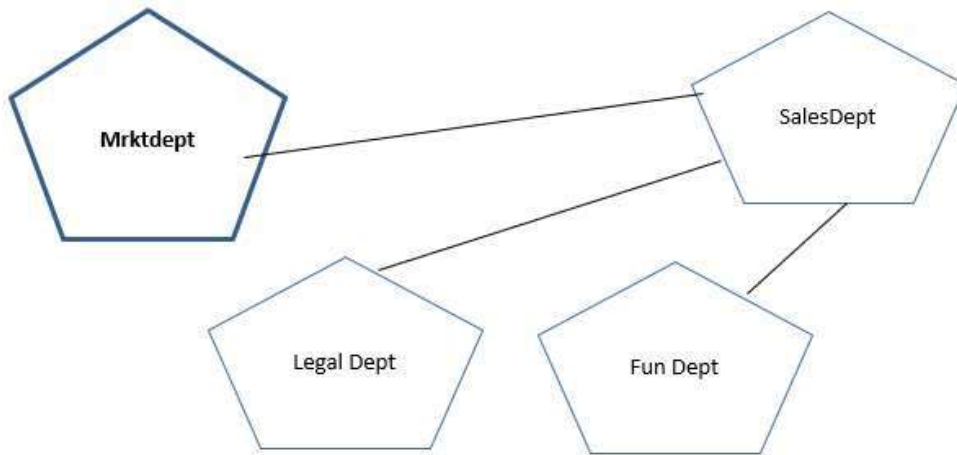
ii) As per 80 – 20 rule, SalesDept because it has maximum no. of computers.

iii)Each building should have hub/switch and Modem in case Internet connection is required.

iv)MAN (Metropolitan Area Network)

5.   VoIP

6.   HTTP is a protocol that is used for transferring hypertext(i.e. text, graphic, image, sound, video, etc,) between 2 computers and is particularly used on the World Wide Web (WWW)

7.

(i) Network Interface Card (NIC) is a network adapter used to set up a wired network. It acts as an interface between computer and the network.

(ii) A repeater is a device that amplifies a signal being transmitted on the network.

Test Yourself: PART II

1. LAN

2.

        a. Star Topology

        b. Bus Topology

3. It is an IP Address. It is used to identify the computers on a network

4. MAN

5. (i)
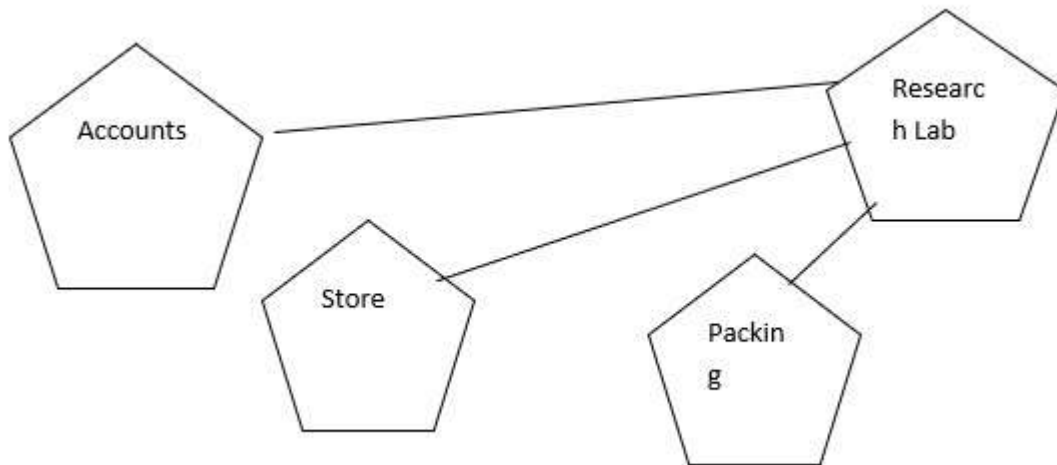
(ii)The most suitable place/ building to house the server of this organization would be building Research Lab, as this building contains the maximum number of computers

(iii). a)Repeater : distance between Store to Research Lab is quite large, so a repeater would ideally be placed.

   b)Hub/Switch : Each would be needed in all the buildings to interconnect the group of cables from the different computers in each building.

6. IP address 192.168.1.1

   URL : https://www.apple.com/

DBMS-DATABASE MANAGEMENT SYSTEM

DBMS:

A database management system (DBMS) is a collection of interrelated data and a set of programs to access those data. The collection of data, usually referred to as the database, contains information relevant to an enterprise. The DBMS provides a way to store and retrieve database information that is both convenient and efficient.

Keeping organizational information in a file- processing system has a number of major disadvantages like:

a) Data redundancy and inconsistency
b) Difficulty in accessing data
c) Data isolation
d) Integrity problems
e) Atomicity problems
f) Concurrent access anomalies
g) Security problems

These difficulties among others, prompted the development of database systems.

- Database systems are designed to manage large bodies of information.
- Management of data involves both defining structures for storage of information and providing mechanisms for the manipulation of information.
- The database system also must ensure the safety of the information stored, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results.
- DBMS lets users to create a database, store, manage, update/modify and retrieve data from that database by users or application programs.

Some examples of open source and commercial DBMS include MySQL, Oracle, PostgreSQL, SQL Server, Microsoft Access, MongoDB.

Database systems are widely used. Some representative applications are :

a) Banking
b) Airlines
c) Universities
d) Telecommunications
e) Sales
f) Finance, etc.

A data model describes the structure of the database, including how data are defined and represented, relationships among data, and the constraints.

Database schema: Database Schema is the design of a database. It is the skeleton of the database that represents the structure (table names and their fields/columns), the type

of data each column can hold, constraints on the data to be stored (if any), and the relationships among the tables.

Database schema is also called the visual or logical architecture as it tells us how the data are organized in a database.

Data constraint: Restrictions or limitations are put on the type of data that can be inserted in one or more columns of a table to ensure accuracy and reliability of data in the database.

Meta – Data or Dictionary: A database catalog or dictionary that has data about data.

Database instance: The state of database at any time, after loading of data. A database schema can have different instances at different times.

Query: A query is a request to a database for obtaining information in a desired way.

Data Manipulation: Modification of database consists of three operations viz. Insertion, Deletion or Update.

Database engine: Database engine is the underlying component or set of programs used by a DBMS to create database and handle various queries for data retrieval and manipulation.

Relational model:

The relational model uses a collection of tables to represent both data and the relationships among those data.

Each table has multiple columns, and each column has a unique name. The relational model is an example of a record – based model.

Record- based models are so named because the database is structured in fixed- format records of several types. Each table contains records of particular type. Each record type defines a fixed number of fields/attributes.

The columns of the table correspond to the attributes of the record type.

A row in a table represents a relationship among a set of values. The relational data model is the *most widely used data model*.

Other types of data models include object-oriented data model, entity-relationship data model, document model and hierarchical data model.

Relation: A Relation is logically related data organized in the form of tables.

Attribute/ Field: Column of a table is called Attribute or Field.

Tuple/ Entity/ Record: Rows of a table is called Tuple or Record.

Domain: It is collection of values from which the value is derived for a column.

Degree - Number of columns (attributes) in a table.

Cardinality - Number of rows (Records) in a table.

Primary Key – A primary is a column or set of columns in a table that uniquely identifies tuples (rows) in that table.

Candidate Key –It is an attribute or a set of attributes or keys participating for Primary Key, to uniquely identify each record in that table.

Alternate Key – Out of all candidate keys, only one gets selected as primary key, remaining keys are known as alternate or secondary keys.

Foreign Key – Foreign keys are the columns of a table that points to the primary key of another table.

STRUCTURED QUERY LANGUAGE(SQL)

Structured Query Language: introduction, Data Definition Language and Data Manipulation Language, data type (char(n), varchar(n), int, float, date), constraints (not null, unique, primary key), create database, use database, show databases, drop database, show tables, create table, describe table.

1.1 What is SQL?

SQL(Structured Query Language) is a language that is used to manage data that is held in a relational database management system. It uses tables to manipulate and retrieve information from databases for analysis.

By using SQL commands, one can search for any data in the database and perform other functions like creating tables, adding records, modifying data, removing rows, dropping tables etc.

1.2 What Can SQL do?

SQL can execute queries against a database

SQL can retrieve data from a database

SQL can insert records in a database

SQL can update records in a database

SQL can delete records from a database

SQL can create new databases

SQL can create new tables in a database

SQL can create stored procedures in a database

SQL can create views in a database

SQL can set permissions on tables, procedures, and views

1.3 ADVANTAGES OF SQL

There are the following advantages of SQL:

● **High speed**

Using the SQL queries, the user can quickly and efficiently retrieve a large amount of records from a database.

● **No coding needed**

In the standard SQL, it is very easy to manage the database system. It doesn't require a substantial amount of code to manage the database system.

- **Well defined standards**

Long established are used by the SQL databases that are being used by ISO and ANSI.

- **Portability**

SQL can be used in laptop, PCs, server and even some mobile phones.

- **Interactive language**

SQL is a domain language used to communicate with the database. It is also used to receive answers to the complex questions in seconds.

- **Multiple data view**

Using the SQL language, the users can make different views of the database structure

1.4 SQL Commands

SQL commands are instructions. It is used to communicate with the database. It is also used to perform specific tasks, functions, and queries of data.

SQL can perform various tasks like create a table, add data to tables, drop the table, modify the table, set permission for users.

1.5 Types of SQL Commands

There are five types of SQL commands: DDL, DML, DCL, TCL, and DQL.
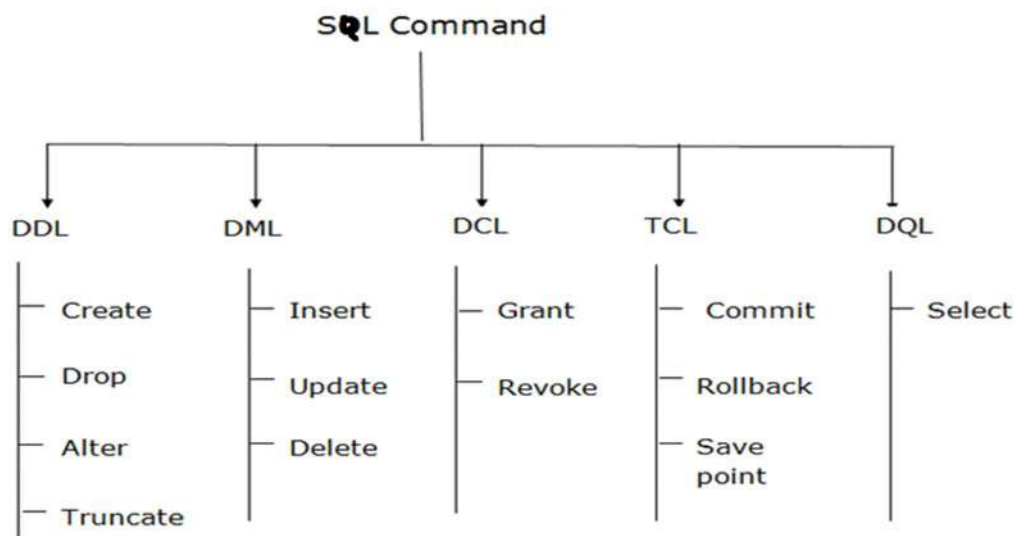
1.5.1 DDL or Data Definition Language

DDL or Data Definition Language actually consists of the SQL commands that can be used to define the database schema. It simply deals with descriptions of the database schema and is used to create and modify the structure of database objects in the database. DDL is

a set of SQL commands used to create, modify, and delete database structures but not data.

List of DDL commands:

CREATE: This command is used to create the database or its objects (like table, index, function, views, store procedure, and triggers).

DROP: This command is used to delete objects from the database.

ALTER: This is used to alter the structure of the database.

TRUNCATE: This is used to remove all records from a table, including all spaces allocated for the records are removed.

COMMENT: This is used to add comments to the data dictionary.

RENAME: This is used to rename an object existing in the database.

1.5.2 DML (Data Manipulation Language):

The SQL commands that deals with the manipulation of data present in the database belong to DML or Data Manipulation Language and this includes most of the SQL statements. It is the component of the SQL statement that controls access to data and to the database. Basically, DCL statements are grouped with DML statements.

List of DML commands:

INSERT : It is used to insert data into a table.

UPDATE: It is used to update existing data within a table.

DELETE : It is used to delete records from a database table.

Difference between DDL and DML:

DDL	DML
It stands for Data Definition Language.	It stands for Data Manipulation Language.
It is used to create database schema and can be used to define some constraints as well.	It is used to add, retrieve or update the data.
It basically defines the column (Attributes) of the table.	It add or update the row of the table. These rows are called as tuple.

1.6 DATATYPES

> **Text Data types**

  Char(size) – fixed length of *size* bytes

  Varchar(size)-variable length of *size* bytes

  Varchar2(size)-variable length of *size* bytes

> **Number Data types**

  Integer(size)or Int- It represents a number without decimal point

  Float(Size)-It represents a floating point number

  Real-Same as float but no size argument is used

> **Date data type**

  Date ,   Time

1.7 CONSTRAINT

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

Types of Constraints:

> **Unique Constraint** :-This ensures that no rows have the same value in the specified column(s)

Syntax:

Create table EMP (ecode integer   unique, ename   char(20),sex char(1),grade char(2));

Unique constraint applied on ecode of EMP table ensures that no rows have the same ecode value

> **Primary key Constraint**:- This declares a column as the primary **key** of the table This is similar to **unique** constraint except that one column (or one group of columns)can be applied in this constraint .

The primary key cannot allow NULL values but Unique key allows NULL values.

The following SQL creates a PRIMARY KEY on the "ID" column when the "Persons" table is created:

  CREATE TABLE Persons (ID int NOT NULL,   LastName varchar(255) NOT NULL,   FirstName varchar(255),   Age int,   PRIMARY KEY (ID));

> **Not null**:-This constraint ensures column should not be **NULL**

Syntax:

Create table EMP(ecode integer Not null unique, ename char(20),sex char(1),grade char(2));

1.8 DATABASE COMMANDS IN MYSQL

➢ **CREATE DATABASE**

CREATE DATABASE is the SQL command used for creating a database in MySQL.

Imagine you need to create a database with name "movies". You can create a database in MySQL by executing following SQL command

Syntax:　　　mysql>CREATE DATABASE movies;

➢ **SHOW DATABASES**

You can see list of existing databases by running following SQL command.

Syntax:　　mysql>SHOW DATABASES;

➢ **USE**

You can use SQL command **USE** to select a particular database.

Syntax:　　mysql>USE database_name;

➢ **DROP DATABASE**

The DROP DATABASE statement is used to drop an existing SQL database.

Syntax　:mysql>DROP DATABASE database_name*;*

CREATE TABLE

The CREATE TABLE statement is used to create a new table in a database.

Syntax:　　CREATE TABLE *table_name* (　*column1 datatype*,　*column2 datatype*,　*column3 datatype*,　....);

Example: The following example creates a table called "Persons" that contains five columns:

PersonID, LastName, FirstName, Address, and City:

```
CREATE TABLE Persons (
    PersonID int,
    LastName varchar(255),
    FirstName varchar(255),
```

Address varchar(255),
    City varchar(255)
);

> **SHOW TABLES;**

We can get the number of table information of a database using the following statement:

    mysql> SHOW TABLES;

> **DESCRIBE TABLE**

Use the **DESCRIBE** command to show the structure of the table, such as column names, constraints on column names, etc. The **DESC** command is a short form of the DESCRIBE command. Both DESCRIBE and DESC commands are equivalent.

Syntax   The following are the syntax to display the table structure:

    mysql> DESCRIBE | **DESC**   table_name;

ALTER TABLE Statement

The ALTER TABLE statement is used to add, delete, or modify columns in an existing table.The ALTER TABLE statement is also used to add and drop various constraints on an existing table.

ALTER TABLE -   ADD Column/Attribute   **To add a column in a table, use the following syntax:**

ALTER TABLE *table_name*   ADD *column_name datatype*;

Example   **ALTER TABLE Customers   ADD Email varchar(255);**

 ALTER TABLE - DROP COLUMN

To delete a column in a table, use the following syntax

        ALTER TABLE *table_name*   DROP COLUMN *column_name*;

 Example   ALTER TABLE Customers   DROP COLUMN Email;

 SQL PRIMARY KEY on ALTER TABLE

To create a PRIMARY KEY constraint on the "ID" column when the table is already created, use the following SQL:

ALTER TABLE table_name   ADD PRIMARY KEY (Column_name);

Example   **ALTER TABLE Persons   ADD PRIMARY KEY (ID);**

 DROP a PRIMARY KEY Constraint

To drop a PRIMARY KEY constraint, use the following SQL:

ALTER TABLE table_name   DROP PRIMARY KEY;

Example :   **ALTER TABLE Persons DROP PRIMARY KEY;**

The SQL DROP TABLE Statement

The DROP TABLE statement is used to drop an existing table in a database.

Syntax   **DROP TABLE *table_name*;**

DROP TABLE Shippers;

INSERT INTO Statement:

The INSERT INTO statement is used to insert new records in a table.

INSERT INTO   Syntax:

It is possible to write the INSERT INTO statement in two ways:

1. Specify both the column names and the values to be inserted:

INSERT INTO *table_name* (*column1*, *column2*, *column3*, ...) VALUES (*value1*, *value2*, *value3*, ...);

2. If you are adding values for all the columns of the table, you do not need to specify the column names in the SQL query. However, make sure the order of the values is in the same order as the columns in the table. Here, the INSERT INTO syntax would be as follows:

INSERT INTO *table_name*   VALUES (*value1*, *value2*, *value3*, ...);

The SQL DELETE Statement:

The DELETE statement is used to delete existing records in a table.

DELETE Syntax:

DELETE FROM *table_name* WHERE *condition*;

Note: Be careful when deleting records in a table! Notice the WHERE clause in the DELETE statement. The WHERE clause specifies which record(s) should be deleted. If you omit the WHERE clause, all records in the table will be deleted!

The following SQL statement deletes all rows in the "Customers" table, without deleting the table:

DELETE FROM Customers;

The SQL SELECT Statement

The SELECT statement is used to select data from a database.

The data returned is stored in a result table, called the result-set.

SELECT Syntax: SELECT *column1*, *column2, ...*   FROM *table_name*;

Here, column1, column2, ... are the field names of the table you want to select data from. If you want to select all the fields available in the table, use the following syntax:

SELECT * FROM *table_name*;

The SQL WHERE Clause:

The WHERE clause is used to filter records.

It is used to extract only those records that fulfill a specified condition.

WHERE Syntax: SELECT *column1*, *column2, ...*FROM *table_name*   WHERE *condition*;

Operators in The WHERE Clause

The following operators can be used in the WHERE clause:

Operator	Description
=	Equal
>	Greater than
<	Less than
>=	Greater than or equal

<=	Less than or equal
<>	Not equal. Note: In some versions of SQL this operator may be written as !=
BETWEEN	Between a certain range
LIKE	Search for a pattern
IN	To specify multiple possible values for a column

The SQL AND, OR and NOT Operators

The WHERE clause can be combined with AND, OR, and NOT operators.

The AND and OR operators are used to filter records based on more than one condition:

- The AND operator displays a record if all the conditions separated by AND are TRUE.
- The OR operator displays a record if any of the conditions separated by OR is TRUE.

The NOT operator displays a record if the condition(s) is NOT TRUE.

AND Syntax

SELECT *column1*, *column2, ...*

FROM *table_name*

WHERE *condition1* AND *condition2* AND *condition3 ...*;

OR Syntax

SELECT *column1*, *column2, ...*

FROM *table_name*

WHERE *condition1* OR *condition2* OR *condition3 ...*;

NOT Syntax

SELECT *column1*, *column2, ...*

FROM *table_name*

WHERE NOT *condition*;

The SQL IN Operator

The IN operator allows you to specify multiple values in a WHERE clause.

The IN operator is a shorthand for multiple OR conditions.

IN Syntax

SELECT *column_name(s)*

FROM *table_name*

WHERE *column_name* IN (*value1*, *value2*, ...);

        or:

SELECT *column_name(s)*

FROM *table_name*

WHERE *column_name* IN (*SELECT STATEMENT*);

The SQL BETWEEN Operator

The BETWEEN operator selects values within a given range. The values can be numbers, text, or dates.

The BETWEEN operator is inclusive: begin and end values are included.

BETWEEN Syntax

SELECT *column_name(s)*

FROM *table_name*

WHERE *column_name* BETWEEN *value1* AND *value2;*

The SQL ORDER BY Keyword

The ORDER BY keyword is used to sort the result-set in ascending or descending order.

The ORDER BY keyword sorts the records in ascending order by default. To sort the records in descending order, use the DESC keyword.

ORDER BY Syntax

      SELECT *column1*, *column2, ...*

      FROM *table_name*

      ORDER BY *column1, column2, ...* ASC|DESC;

Example

SELECT * FROM Customers

ORDER BY Country;

 ORDER BY DESC Example

The following SQL statement selects all customers from the "Customers" table, sorted DESCENDING by the "Country" column:

      SELECT * FROM Customers

      ORDER BY Country DESC;

ORDER BY Several Columns Example

The following SQL statement selects all customers from the "Customers" table, sorted by the "Country" and the "CustomerName" column. This means that it orders by Country, but if some rows have the same Country, it orders them by CustomerName:

Eg: SELECT * FROM Customers   ORDER BY Country, CustomerName;

SQL Aliases

SQL aliases are used to give a table, or a column in a table, a temporary name.

Aliases are often used to make column names more readable.

An alias only exists for the duration of that query.

An alias is created with the AS keyword.

Alias Column Syntax: SELECT *column_name* AS *alias_name*   FROM *table_name;*

Alias Table

Syntax: SELECT *column_name(s)*   FROM *table_name* AS *alias_name;*

The SQL UPDATE Statement

The UPDATE statement is used to modify the existing records in a table.

UPDATE   Syntax: UPDATE *table_name*   SET *column1* = *value1*, *column2* = *value2*, ...

WHERE *condition*;

UPDATE Table

The following SQL statement updates the first customer (CustomerID = 1) with a new contact person *and* a new city.

UPDATE Customers

SET ContactName = 'Alfred Schmidt', City= 'Frankfurt'

WHERE CustomerID = 1;

The SQL SELECT DISTINCT Statement

The SELECT DISTINCT statement is used to return only distinct (different) values.

Inside a table, a column often contains many duplicate values; and sometimes you only want to list the different (distinct) values.

SELECT DISTINCT Syntax:

SELECT DISTINCT *column1*, *column2, ...*FROM *table_name*;

SELECT Example Without DISTINCT

The following SQL statement selects all (including the duplicates) values from the "Country" column in the "Customers" table:

Eg: **SELECT Country FROM Customers;**

Now, let us use the   **SELECT DISTINCT statement**

and see the result.

SELECT DISTINCT Examples

The following SQL statement selects only the DISTINCT values from the "Country" column in the "Customers" table:

SELECT DISTINCT Country FROM Customers;

The following SQL statement lists the number of different (distinct) customer countries:

SELECT COUNT(DISTINCT Country) FROM Customers;

The SQL LIKE Operator

The LIKE operator is used in a WHERE clause to search for a specified pattern in a column.

There are two wildcards often used in conjunction with the LIKE operator:

- The percent sign (%) represents zero, one, or multiple characters
- The underscore sign (_) represents one, single character

The percent sign and the underscore can also be used in combinations!

LIKE Syntax

SELECT *column1, column2, ...*

FROM *table_name*

WHERE *columnN* LIKE *pattern*;

LIKE Operator	Description
WHERE CustomerName LIKE 'a%'	Finds any values that start with "a"
WHERE CustomerName LIKE '%a'	Finds any values that end with "a"
WHERE CustomerName LIKE '%or%'	Finds any values that have "or" in any position
WHERE CustomerName LIKE '_r%'	Finds any values that have "r" in the second position
WHERE CustomerName LIKE 'a_%'	Finds any values that start with "a" and are at least 2 characters in length
WHERE CustomerName LIKE 'a__%'	Finds any values that start with "a" and are at least 3 characters in length
WHERE ContactName LIKE 'a%o'	Finds any values that start with "a" and ends with "o"

What is a NULL Value?

A field with a NULL value is a field with no value.

If a field in a table is optional, it is possible to insert a new record or update a record without adding a value to this field. Then, the field will be saved with a NULL value.

How to Test for NULL Values?

It is not possible to test for NULL values with comparison operators, such as =, <, or <>.

We will have to use the IS NULL and IS NOT NULL operators instead.

IS NULL Syntax

SELECT *column_names*

FROM *table_name*

WHERE *column_name* IS NULL;

 IS NOT NULL Syntax

SELECT *column_names*

FROM *table_name*

WHERE *column_name* IS NOT NULL;

The IS NULL Operator

The IS NULL operator is used to test for empty values (NULL values).

The following SQL lists all customers with a NULL value in the "Address" field:

SELECT CustomerName, ContactName, Address

FROM Customers

WHERE Address IS NULL;

The IS NOT NULL Operator

The IS NOT NULL operator is used to test for non-empty values (NOT NULL values).

The following SQL lists all customers with a value in the "Address" field:

SELECT CustomerName, ContactName, Address

FROM Customers

WHERE Address IS NOT NULL;

Aggregate (Group) function

- Aggregate functions are the functions that operate on a set of rows to give one result per group.
- These sets of rows on which group function is applied may be the whole table or the table split into groups.

Types of Group Functions

Function	Description
sum()	Find the sum of numeric values
avg()	Find the average of numeric values
count()	Counts the number of rows in a table
max()	Find the maximum among all the values in a column
min()	Find the minimum among all the values in a column

Remember the following points about group functions:

- All group functions,except count(*) ignore NULL values
- Functions -sum(),avg() are used with NUMERIC data.
- Functions -min() and max() can be used with any data type

Example:

Consider the following table employee

```
mysql> select * from employee;
+-----+---------+--------+--------+------+-------+------+
| No  | Name    | Salary | Zone   | Age  | Grade | Dept |
+-----+---------+--------+--------+------+-------+------+
|   1 | Mukul   |  30000 | West   |   28 | A     |   10 |
|   2 | Kritika |  35000 | Centre |   30 | A     |   10 |
|   3 | Naveen  |  32000 | West   |   40 | NULL  |   20 |
|   4 | Uday    |  38000 | North  |   38 | C     |   30 |
|   5 | Nupur   |  32000 | East   |   26 | NULL  |   20 |
|   6 | Moksh   |  37000 | South  |   28 | B     |   10 |
|   7 | Shelly  |  36000 | North  |   26 | A     |   30 |
+-----+---------+--------+--------+------+-------+------+
7 rows in set (0.00 sec)
```

Q: Find the sum, average, minimum, maximum value of salaries of employees in the employee table

```
mysql> select sum(salary),min(salary),avg(salary),max(salary) from employee;
+-------------+-------------+-------------+-------------+
| sum(salary) | min(salary) | avg(salary) | max(salary) |
+-------------+-------------+-------------+-------------+
|      240000 |       30000 |  34285.7143 |       38000 |
+-------------+-------------+-------------+-------------+
1 row in set (0.00 sec)
```

Count() function

Count () has got three formats:

Count(*)

This function returns the number of rows in the table that satisfy the criteria of select statement.
In its counting, it includes duplicate rows and rows with NULL values in any of the column
Example:

Q: Count the number of employees in the employee table.

```
mysql> select count(*) from employee;
+----------+
| count(*) |
+----------+
|        7 |
+----------+
1 row in set (0.00 sec)
```

Count(<col name>)

● This function returns the number of not null values in the specified column, but includes duplicate values in counting

Example

Q; count the number of grades of employees in the employee table.

```
mysql> select count(grade) from employee;
+--------------+
| count(grade) |
+--------------+
|            5 |
+--------------+
1 row in set (0.00 sec)
```

Count(DISTINCT <col name>)

This function returns the number of unique, not null values in the specified column.

Example

Q Count the number of different grades of the employee

```
mysql> select count(distinct grade) from employee;
+-----------------------+
| count(distinct grade) |
+-----------------------+
|                     3 |
+-----------------------+
1 row in set (0.00 sec)
```

Grouping Records (Group by clause)

- To divide the rows in a table into smaller groups of information, group by clause is used.
- It combines all identical rows in a group of fields.
- A column name is used for grouping

Syntax;-

> **SELECT [DISTINCT] <COL LIST> FROM <TABLE NAME>**
> **[WHERE <CONDITION>]**
> **[GROUP BY < GROUP BY EXPR>]**
> **[HAVING <CONDITION>]**
> **[ORDER BY <COL NAME>/<EXPR> ASC/DESC];**

NOTE -

- Group by expression specifies the columns whose values determine the basics for grouping rows
- WHERE clause is always before GROUP BY if required.

Example

Q. Display the no of employees in each zone.

```
mysql> select zone,count(zone) from employee group by zone;
+--------+-------------+
| zone   | count(zone) |
+--------+-------------+
| Centre |           1 |
| East   |           1 |
| North  |           2 |
| South  |           1 |
| West   |           2 |
+--------+-------------+
5 rows in set (0.01 sec)
```

Q. Display the no of employees in each zone whose salary is greater than 32000

```
mysql> select zone,count(zone) from employee where salary>32000 group by zone;
+--------+-------------+
| zone   | count(zone) |
+--------+-------------+
| Centre |           1 |
| North  |           2 |
| South  |           1 |
+--------+-------------+
3 rows in set (0.00 sec)
```

Having clause

- This clause is used to restrict rows resulting after grouping.
- Steps followed in execution of select with group by and having clause-
    1. Rows are grouped according to the columns in the group by clause.
    2. Then the group function is applied.
    3. Groups matching with Having clauses are displayed.

Example

Q. Display only whose departments with sum of salaries whose total salary is greater than 70000

```
mysql> select dept,sum(salary) from employee group by dept having sum(salary)>70000;
+------+-------------+
| dept | sum(salary) |
+------+-------------+
|   10 |      102000 |
|   30 |       74000 |
+------+-------------+
2 rows in set (0.00 sec)
```

Cartesian Product (Cross Join or unrestricted join)

- Returns all the rows in the two tables listed in the query.
- Each row of the first table is paired with all the rows in the second table.
- This happens when there is no relationship between two tables.
- It is rarely useful.

Example- Consider the following tables

```
mysql> SELECT * FROM EMPLOYEE;
+------+---------+--------+--------+------+-------+------+
| No   | Name    | Salary | Zone   | Age  | Grade | Dept |
+------+---------+--------+--------+------+-------+------+
|    1 | Mukul   |  30000 | West   |   28 | A     |   10 |
|    2 | Kritika |  35000 | Centre |   30 | A     |   10 |
|    3 | Naveen  |  32000 | West   |   40 | NULL  |   20 |
|    4 | Uday    |  38000 | North  |   38 | C     |   30 |
|    5 | Nupur   |  32000 | East   |   26 | NULL  |   20 |
|    6 | Moksh   |  37000 | South  |   28 | B     |   10 |
|    7 | Shelly  |  36000 | North  |   26 | A     |   30 |
|    8 | Mukul   |  40000 | West   |   50 | C     |   10 |
+------+---------+--------+--------+------+-------+------+
8 rows in set (0.00 sec)

mysql> SELECT * FROM DEPARTMENT;
+------+-------------+
| Dept | Dname       |
+------+-------------+
|   10 | Mechanical  |
|   20 | Electrical  |
|   30 | Computer Sci|
+------+-------------+
3 rows in set (0.00 sec)
```

Q: To display the name of the employees and their department name


```
mysql> select Name,Dname from employee,department;
+----------+-------------+
| Name     | Dname       |
+----------+-------------+
| Mukul    | Mechanical  |
| Mukul    | Electrical  |
| Mukul    | Computer Sci|
| Kritika  | Mechanical  |
| Kritika  | Electrical  |
| Kritika  | Computer Sci|
| Naveen   | Mechanical  |
| Naveen   | Electrical  |
| Naveen   | Computer Sci|
| Uday     | Mechanical  |
| Uday     | Electrical  |
| Uday     | Computer Sci|
| Nupur    | Mechanical  |
| Nupur    | Electrical  |
| Nupur    | Computer Sci|
| Moksh    | Mechanical  |
| Moksh    | Electrical  |
| Moksh    | Computer Sci|
| Shelly   | Mechanical  |
| Shelly   | Electrical  |
| Shelly   | Computer Sci|
| Mukul    | Mechanical  |
| Mukul    | Electrical  |
| Mukul    | Computer Sci|
+----------+-------------+
24 rows in set (0.00 sec)
```

Joins in MySQL

- A join is used when data from two or more tables is required.
- Rows in one table can be joined to the rows in another table based on the common values existing in corresponding columns of two tables.
- Joins are used to retrieve data from tables related to each other with primary-foreign key relationships.
- There are many types of join

Equi join

- Specified columns from the joining tables are checked for equality.
- Values from joining tables are retrieved only if the condition in where clause is satisfied.

SYNTAX:-

    SELECT <column_name (s)>
    FROM <table_name1>, <table_name2>, ..., <table_nameN>
    WHERE <table_name1>.<column_name> = <table_name2>.<column_name>;

Q: to display the name of the employee and their department


```
mysql> select name,dname from employee e,department d where e.dept = d.dept;
+----------+-------------+
| name     | dname       |
+----------+-------------+
| Mukul    | Mechanical  |
| Kritika  | Mechanical  |
| Naveen   | Electrical  |
| Uday     | Computer Sci|
| Nupur    | Electrical  |
| Moksh    | Mechanical  |
| Shelly   | Computer Sci|
| Mukul    | Mechanical  |
+----------+-------------+
8 rows in set (0.00 sec)
```

alias Name of the table

Note-

To join n tables together minimum of n-1 join conditions are to be satisfied.

Results of Equi joins are the same as simple joins or inner joins. Inner join (simply join) uses on clause.

You should always qualify the columns when joining tables having the same name as corresponding columns. To qualify the columns we use "." (dot) operator.

Natural Join

This clause is based on all the columns in the two tables that have the same name.

It selects the rows from two tables that have equal values in the matched columns.

SYNTAX:-

```
SELECT [column_names | *]

FROM table_name1

NATURAL JOIN table_name2;
```

Example- consider the same tables employee and department.

Q : To display the name of employee and department of all employee

Note-No need to specify the column names to join. Works with same column name in both the tables. The Resulting table has unique columns.

Interface Python with SQL database

Contents:

> ➢ Connecting SQL with Python
> ➢ Creating database connectivity applications
> ➢ Performing insert, delete, update,delete queries
> ➢ Display data by using fetchone(), fetchall(), fetchmany (), rowcount()

Database connectivity

Database connectivity refers to connection and communication between an application and a database system.

The term "front-end" refers to the user interface, while "back-end" means the server, application and database that work behind the scenes to deliver information to the user.

- Mysql.connector- Library or package to connect from python to MySQL.

  Before we connect the program with mysql , we need to install connectivity package named mysql-connector- python

- Command to install connectivity package:-   pip install mysql-connector-python

- Command to import connector:- import mysql.connector

- Steps for python MySQL connectivity

    1 . Install Python

    2. Install MySQL

    3. Open Command prompt

    4. Switch on internet connection

    5. Type pip install mysql-connector-python and execute

    6. Open python IDLE

    7. import mysql.connector

Steps for creating database connectivity applications:

1. Start Python- start python editor to create our own python script.

2.Import mysql.connector package

Use the following statement for this.

import mysql.connector   or

import mysql.connector as Con

3.<u>Establishing a connection to Mysql DATABASE.</u>

We need to establish a connection to a mysql database using connect () function of mysql.connector package.

The connect statement creates a connection to the mysql server and returns a MySQL connection object.

Syntax:

<Connection object> = mysql.connector.connect (host=<hostname>,

user=<username>, passwd:<password>, database=<dbname>)

For eg: import mysql.connector

con=mysql.connector.connect(host="localhost",user="root", passwd=" ")

4. Creating a cursor Object

It is a useful control structure of database connectivity. It will let us execute all the queries we need. Cursor stores all the data as a temporary container of returned data and allows traversal so that we can fetch data one row at a time from cursor. Cursors are created by the connection.cursor() method.

Syntax:

<cursor object>=<connectionobject>.cursor()

Eg: cursor=con.cursor()

5. Execute SQL query:

We can execute SQL query using execute() function .

Syntax: <cursor object>.execute(SQL QUERY)

Eg: cursor.execute("select * from data")

The above code will execute the sql query and store the retrieved records (resultset) in the cursor object(cursor).

Result set refers to a logical set of records that are fetched from the database by executing an sql query and made available in the program.

6.Extract data from Result set:

The records retrieved from the database using SQL select query has to be extracted as record from the result set. We can extract data from the result set using the following fetch () function.

fetchall()

fetchone()

fetchmany()

> **Multiple ways to retrieve data:**
> * fetchall()- Fetches all (remaining) rows of a query result, returning them as a sequence of sequences (e.g. a list of tuples) .
> * fetchone()-Fetches the next row of a query result set, returning a single sequence or None when no more data is available
> * fetchmany (size)-Fetches the next set of rows of a query result, returning a sequence of sequences. It will return number of rows that matches to the size argument.

Functions to execute SQL queries

 # TO CREATE DATABASE SCHOOL USING PYTHON INTERFACE

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
")
 mycursor=mydb.cursor()
mycursor.execute("CREATE DATABASE SCHOOL")
```

 # SHOW DATABASE

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="system")
```

```
    mycursor=mydb.cursor()
   mycursor.execute("SHOW DATABASES")
  for x in mycursor:
       print (x)
```

TO CREATE A TABLE IN MYSQL USING PYTHON INTERFACE

```
      import mysql.connector
      mydb=mysql.connector.connect(host="localhost",user="root",passwd="s
      ystem",database="student")
       mycursor=mydb.cursor()
      mycursor.execute("CREATE TABLE FEES (ROLLNO INT,NAME
      VARCHAR(20),AMOUNT INT);")
```

TO SHOW THE TABLES IN MYSQL USING PYTHON INTERFACE

```
      import mysql.connector
      mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
      ",database="student")
      mycursor=mydb.cursor()
      mycursor.execute("SHOW TABLES")
      for x in mycursor:
              print(x)
```

#TO DESCRIBE TABLE STRUCTURE USING PYTHON INTERFACE

```
      mydb=mysql.connector.connect(host="localhost",user="root",passwd="system"
      ,database="student")

      mycursor=mydb.cursor()
      mycursor.execute("DESC STUDENT")
      for x in mycursor:
        print(x)
```

TO EXECUTE SELECT QUERY USING A PYTHON INTERFACE

```
      import mysql.connector
      conn=mysql.connector.connect(host="localhost",user="root",passwd="12345
      ",database="student")
       c=conn.cursor()
      c.execute("select * from student")
      r=c.fetchone()
      while r is not None:
```

```
        print(r)
        r=c.fetchone()
```

TO EXECUTE SELECT QUERY WITH WHERE CLAUSE USING A PYTHON INTERFACE

```
import mysql.connector
conn=mysql.connector.connect(host="localhost",user="root",passwd="12345",
database="student")
if conn.is_connected()==False:
    print("Error connecting to MYSQL DATABASE")
c=conn.cursor()
c.execute("select * from student where marks>90")
r=c.fetchall()
count=c.rowcount
print("total no of rows:",count)
for row in r:
    print(row)
```

#TO INSERT A RECORD (ROLLNO,NAME,AND MARKS) IN MYSQL TABLE student USING
#PYTHON INTERFACE

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
",database="student") mycursor=mydb.cursor()
r=int(input("enter the rollno"))
n=input("enter name")
m=int(input("enter marks"))
mycursor.execute("INSERT INTO student(rollno,name,marks)
VALUES({},'{}',{})".format(r,n,m))
mydb.commit()
print(mycursor.rowcount,"RECORD INSERTED")
```

TO UPDATE A DATA IN A TABLE USING PYTHON INTERFACE

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="syste
m",database="student") mycursor=mydb.cursor()
mycursor.execute("UPDATE STUDENT SET MARKS=100 WHERE MARKS=40")
mydb.commit()
print(mycursor.rowcount,"RECORD UPDATED")
```

 # TO DELETE A RECORD FROM THE TABLE USING PYTHON INTERFACE

```
 import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
",database="student")
 mycursor=mydb.cursor()
mycursor.execute("DELETE FROM STUDENT WHERE MARKS<50")
mydb.commit()
print(mycursor.rowcount,"RECORD DELETED")
```

 # TO DROP AN ENTIRE TABLE FROM MYSQL DATABASE USING PYTHON INTERFACE

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
",database="student")
mycursor=mydb.cursor()
mycursor.execute("DROP TABLE STUDENT")
```

 # TO ADD A COLUMN IN THE EXISTING TABLE USING PYTHON INTERFACE

```
 import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
",database="student")
 mycursor=mydb.cursor()
mycursor.execute("ALTER TABLE STUDENT ADD AGE INT")
mydb.commit()
```

#TO DROP A COLUMN FROM THE TABLE USING PYTHON INTERFACE

```
 import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
",database="student")
 mycursor=mydb.cursor()
mycursor.execute("ALTER TABLE DROP AGE ")
mydb.commit()
```

 # TO ALTER THE DATATYPE OF A COLUMN IN A TABLE USING PYTHON INTERFACE

```
 import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="syste
m",database="student")
 mycursor=mydb.cursor()
 mycursor.execute("ALTER TABLE STUDENT MODIFY GRADE CHAR(3)")
```

- ❖ commit( ): After executing insert or update query we must commit our transaction using commit method of connection object.
  Eg: mycon.commit()
- ❖ rollback( ): mysqlConnection.rollback() reverts the changes made by the current transaction.
- ❖ rowcount: This attribute returns the number of rows that were affected by an execute()

Closing cursor and connection

Since the database can keep limited number of connections at a time ,

we must close the connection using

cursorobject.close()

Eg: mycursor.close()

con.close()

Model Questions

I. Multiple choice Questions(MCQ):

1. DBMS stands for_____
a) Data Base Management Software

b) Data Base Maintenance System

c) Data Basic Management System

d) Data Base management system

2. In RDBMS, R stands for_____
a) Relational   b)Rotational   c)Rational   d)None of the above

3. A Database contains one or more_____
a) Data   b)Tables   c)Files   d)Links

4. What is not true in respect of DBMS?
a) Database enforces standards

b) Database increases redundancy

c) Database facilitates sharing of data

d) Database helps to maintain integrity

5. Cardinality is total _____
a) number of rows in a table
b) number of columns in a table
c) number of data items in a table
d) none of the above

6. Degree refers to total_____
a)   number of rows in a table
b)   number of columns in a table
c)   number of data items in a table
d)   none of the above

7. Referential Integrity is a rule that ensures _____ between records in related tables are valid.
a)   Links   b)difference   c)relationship   d)similarity

8. Data about data is _____
a)   Data redundancy
b)   Meta Data
c)   Database schema
d)   None of the above

9. Repetition of data is called ....
a)   Data redundancy
b)   Data Description
c)   Data inconsistency
d)   None of the above

10. Mismatched redundant copies of data is known as data ....
a)   Dependence   b)Inconsistency   c)Isolation   d)Redundancy

11. A .... is an organized collection of structured data.
a)   Database
b)   File
c)   DBMS
d)   Information

12. A data .... is a set of rules that define valid data.

a)   Query   b)Constraint   c)Dictionary   d)All of the above

13. A relational database consists of a collection of ....

a)   Fields   b)Records   c)Keys   d)Tables

14. A row in a database.

a)   Field   b)Record   c)Key   d)Table

15. The term _____ is used to refer to a field in a table.

a)   Attribute   b)Row   c)Tuple   d)Instance

16. Which of the following statements is not true about relational database?

a)   Relational data model is the most widely used data model.

b)   The data is arranged as a collection of tables in relational database.

c)   Relational database increases data redundancy and inconsistency.

d)   None of the above.

17. Which of the following is a disadvantage of file processing system?

a)   Data redundancy

b)   Data isolation

c)   Data inconsistency

d)   All of the above

18. A _____ is a property of the entire relation, rather than of the individual tuples in which each tuple is unique.

a)   Rows   b)Key   c)Attribute   d)Fields

19. Which one of the following attribute can be taken as a primary key?

a)   Name   b)Street   c)Id   d)Department

20. A _____ integrity constraint requires that the values appearing in specified attributes of any tuple in the referencing relation also appear in specified attributes of at least one tuple in the referenced relation.

a)   Referencing   b)Referential   c)Primary   d)Specific

21. Answer the questions based on the table Employee.

Table: Employee

EMPID	ENAME	SALARY	DEPTNO	Email
1001	George	30000	10	George23@yahoo.co.in
1002	Mary	32000	12	Mary_123@yahoo.co.in
1003	Alwin	25000	12	Al_win@gmail.com
1004	Sumit	20000	11	Sumit_222@yahoo.co.in

a) The cardinality of the table Employee is ……

i)   5   ii)4   iii)3   iv)6

b) The degree of the table Employee is …….

i)   3   ii)4   iii)5   iv)6

c) Which column can be made as the primary key in the table Employee?
   i)   EMPID
   ii)   EMAIL
   iii)   Both i and ii
   iv)   None of the above

d) If two columns are added to the table Employee, then the cardinality and degree of the table is …… and …… respectively.
   i)   4 , 7
   ii)   7, 4
   iii)   6,5
   iv)   5,6

e) State True/False:
   Both EMPID and EMAIL can be defined as primary key in the table Employee.

   i) **True**   ii)False

22. An attribute in a relation is a foreign key if it is the _____ key in any other relation.
   a) Candidate   b)Primary   c)Super   d)Sub

23. A(n) _____ in a table represents a logical relationship among a set of values.
    a) Column   b)Key   c)Row   d)Attribute

24. Which of the following attributes can be considered as a choice for the primary key?
    a) Name   b)Street   c)RollNo   d)Subject

Fill in the blanks:

1) _____ helps in efficient retrieval, inserting and deleting of data.

2) _____ is a software for creating and managing databases.

3) _____ means that data is accurate and consistent in the database.

4) _____- ensure that the database properly changes states upon a successfully committed transaction.

5) RDBMS stands for _____.

6) In RDBMS a database is considered as a collection of _____

7) Collection of rows and columns are called as _____

8) Record is also called as a _____

9) The group of one or more columns used to uniquely identify each row of a relation is called_____

10) _____ is data about data.

11) A _____ is a request to a database for obtaining information in a desired way.

12) _____ is collection of values from which the value is derived for a column.

13) _____ are the columns of a table that points to the primary key of another table.

Worksheet 1:

1.There is a column HOBBY in a Table CONTACTS. The following two statements are giving different outputs. What may be the possible reason ?

       a.SELECT COUNT(*) FROM CONTACTS;

       b.SELECT COUNT(HOBBY)FROM CONTACTS;

2. Given the following employee table:-

Employee_ID	NAME	Commission
101	Sabhyata Sharma	NULL
102	Divya Arora	8900
103	Faizal Zaidi	NULL

       a.What values will the following statements return ?

       b.SELECT COUNT(*) FROM Employee;

       c. SELECT COUNT(Commission) FROM Employee;

3..What will be the output of the following queries on the basis of Employee table:

```
+--------+--------+--------+
| EmpId  | EName  | Salary |
+--------+--------+--------+
| A001   | Bob    |  5600  |
| A002   | John   |  NULL  |
| A003   | Tom    |  5000  |
+--------+--------+--------+
```

    a. Select avg(Salary) from Employee;

    b. Select Salary+100 from Employee where EmpId='A002';

4. Kunal has entered the following SQL command on Table 'STUDENT' that has TotalMarks as one of the columns.

SELECT COUNT (*) FROM STUDENT;

The output displayed is 20.   Then, Kunal enters the following command :

    SELECT COUNT (*) FROM STUDENT WHERE TotalMarks <100;

The output displayed is 15. Then, Kunal enters the following command :

    SELECT COUNT (*) FROM STUDENT WHERE TotalMarks >= 100;

He predicts the output of the above query as 5. Do you agree with Kunal ? Give reason for your answer.

5. Consider the table given below :

(Table : Salesperson)

SID	Name	Phone	DOB	Salary	Area
S101	Amit Kumar	98101789654	1967-01-23	67000.00	North
S102	Deepika Sharma	99104567834	1992-09-23	32000.00	South
S103	Vinay Srivastav	98101546789	1991-06-27	35000.00	North
S104	Kumar Mehta	88675345789	1967-10-16	40000.00	East
S105	Rashmi Kumar	98101567434	1972-09-20	50000.00	South

Write command for (i) and output for (ii)

i) To display Area along with number of Salespersons working in that area.

(ii) SELECT Area, COUNT (*) FROM Salesperson GROUP BY Area HAVING COUNT (*) > 1;

6. Consider the table 'PERSONS' given below. Write commands in SQL for (i) to (iv) and write output for (i) to (iii)

PId	Surname	Firstname	Gender	City	Pincode	Basic salary
1	Sharma	Geeta	F	Udhamwara	182141	50000
2	Singh	Surinder	M	Kupwara Nagar	193222	75000
3	Jacob	Peter	M	Bhawani	185155	45000
4	Alvis	Thomas	M	Ahmed Nagar	380025	50000
5	Mohan	Garima	M	Nagar Coolangatta	390026	33000
6	Azmi	Simi	F	New Delhi	110021	40000
7	Kaur	Manpeet	F	Udhamwara	182141	42000

(i)   SELECT SUM(BasicSalary) FROM Persons Where Gender='F';

(ii)   SELECT Gender,MIN(BasicSalary) FROM Persons GROUP BY gender;

(iii)   SELECT Gender,Count(*) FROM Persons GROUP BY Gender;

7. In a database there are two tables 'Customer' and 'Bill' as shown below:

Customer

CustomerID	CustomerName	CustAddress
1	Akhilesh Narang	C4,Janak Puri,Delhi
2	Purnima Williams	B1, Ashok Vihar,Delhi
3	Sumedha Madaan	33, South Ext.,Delhi

Bill

BillNo	CustID	Bill_Amt
1	2	12000
2	1	15000
3	2	13000
4	3	13000
5	2	14000

(i) How many rows and how many columns will be there in the Cartesian product of these two tables?

(ii) Which column in the 'Bill' table is the foreign key?

8. Consider the tables HANDSETS and CUSTOMER given below:

Handsets

SetCode	SetName	TouchScreen	PhoneCost
N1	Nokia 2G	N	5000
N2	Nokia 3G	Y	8000
B1	BlackBerry	N	14000

Customer

CustNo	SetNo	CustAddress
1	N2	Delhi
2	B1	Mumbai
3	N2	Mumbai
4	N1	Kolkata
5	B1	Delhi

With reference to these tables, Write commands in SQL for (i) and (ii) and output for (iii) below:

(i) Display the CustNo, CustAddress and corresponding SetName for each customer.

(ii) Display the Customer Details for each customer who uses a Nokia handset.

(iii) select SetNo, SetName from Handsets, customer where SetNo = SetCode and CustAddress = 'Delhi';

9. Consider the tables DOCTORS and PATIENTS given below:

DOCTORS

DocID	DocName	Department	OPD_Days
101	M. Panday	ENT	TTS
102	G. P. Gupta	Paed	MWF
201	C.K. Sharma	Ortho	MWF

PATIENTS

PatNo	PatName	Department	DocID
1	Neeraj	ENT	101
2	Mohit	Ortho	201
3	Ragini	ENT	101
4	Mohit	Paed	102
5	Nandini	Ortho	201

With reference to these tables, write commands m SQL for (I) and (II) and output for (iii) below:

(i) Display the PatNo, PatName and corresponding DocName for each patient

(ii) Display the list of all patients whose OPD_Days are MWF.

(iii) select OPD_Days, Count(*) from Doctors, Patients where Patients.Department = Doctors.Department Group by OPD_Days;

Worksheet 2

1. The following table represents information on sales representatives of ABC company with the following data.

     Sales man name

     Code

     Address

     commission

     salary.

Write Python code to create the above table.

2.Write Python mysql connectivity program to retrieve all the data from a table student.

3.Write a python code to delete all the records from employee table whose age >60 and the table has the following fields.   Empid, empname, deptid, age, payscale

4. Consider the information stored in the table : EMP

EMPNO	ENAME	DEPT	SALARY
1	ALEX	MUSIC	60000
2	PETER	ART	67000
3	JOHNY	WE	55000
4	RAMBO	P&HE	48000

   A python code is written to access the records of table: EMP, What will be the output of following code:

Assume All basic setup related to connection and cursor creation is already done

```
query="select * from emp"
mycursor.execute(query)
results = mycursor.fetchone()
results = mycursor.fetchone()
results = mycursor.fetchone()
```

```
d = int (results[3])

print (d*3)
```

5. Consider the following Python code is written to access the details of employee, whose employee number is passed to function:

Complete the missing statements:

```
def Search(eno):

        import mysql.connector
        mydb=mysql.connector.connect(host="localhost",user="root",passwd="sy
        stem",database="DB")
        mycursor=mydb.cursor()
        query="select * from emp where empno=_____".format(eno)
        mycursor.execute(query)
        results = mycursor._____
        print(results)
```

6. Consider the following python code for updating the records.

```
        import mysql.connector
        mydb=mysql.connector.connect(host="localhost",user="root",passwd="
        system",database="student")
        mycursor=mydb.cursor()
        mycursor.execute("UPDATE STUDENT SET MARKS=95 WHERE MARKS=50")
        print(mycursor.rowcount,"RECORD UPDATED")
```

Code is running but the record in actual database is not updating, what could be the possible reason?

7. Which function of connection is used to check whether connection to mysql is successfully done or not?

import mysql.connector as msq

```
con=msq.connect(#ConnectionString)    #Assuming all parameter required as
passed
            if_____:
                    print("Connected!")
            else:
                    print(" Error! Not Connected")
```

8. What is the difference in fetchall() and fetchone()?

9.Write a python connectivity program to retrieve data, one record at a time from EMP table for employees with id<10.

10. Write python connectivity program to delete the employee record whose name is read from the keyboard at execution time.

11.SD School is managing the student data in student table in school database. Write a python code that connects to database school and display the record of students and total number of students.

12.Which record will get inserted in the table by the following code:

```
        Import   mysql.connector
        mydb=mysql.connector.connect(host="localhost",user="root",passwd="s
        ystem",database="db")
        mycursor=mydb.cursor()
        a=1011
        b="Euphoria"
        c=599.00
        mycursor.execute("INSERT INTO BOOKS(bookid,bname,price) VALUES
        ({},'{}',{})"  .format(a,b,c))
         mydb.commit()
```

WORKSHEET 3 - Fill in the blanks

1.A ------------------ is a special control structure that facilitates the row by row processing of records in the resultset.

2.After importing mysqlconnector, first of all -------------is established by using connect()

3.-----------------method executes a database query from within Python.

4. Running of sql query through database cursor returns the table records in the form of--------------

5.A connectivity package---------------must be imported before running db connection program.

WORKSHEET 4 -(Multiple Choice questions:)

1.Which of the following is not a legal method for fetching records from database.

a)fetchone()   b)fetchtwo()   c)fetchall()   d)fetchmany()

2.To fetch one record from resultset you may use<curor>………… method.

    a)fetch()   b)fetchone()   c)fetchtuple   d)none of these.

3.To reflect the changes made in the database permanently you need to run……..

    a)done()   b)reflect()   c)commit()   d)final

4.To run an sql query from within python you may use cursor.------------- method.

    a)query()   b)execute()   c)commit()   d)final()

5.A database …………..controls the connection to an actual database , established in program.

    a)database object   b)connection object c)fetch object d)query object

Very Short Answer Questions:

1. What is meant by a database?

A database is an organized collection of structured information, or inter-related data, typically stored in a computer system.

2. What is primary key?

A primary key is a column or set of columns that contain values that uniquely identify each row in a table.

3. What do you mean by candidate key?

It is an attribute or a set of attributes or keys participating for Primary Key, to uniquely identify each record in that table.

4. What is meant by degree and cardinality of a table?

Degree refers to the number of attributes/columns in a relation. Cardinality refers to the number of tuples/rows in a relation

5. What is meant by RDBMS?

RDBMS (relational database management system) is the software used to store, manage, query, and retrieve data stored in a relational database. The RDBMS provides an interface between users and applications and the database, as well as administrative functions for managing data storage, access and performance.

6. What is meant by database schema?

Database schema is also called the visual or logical architecture as it tells us how the data are organized in a database.

7. What is meant by data constraint?

Restrictions or limitations are put on the type of data that can be inserted in one or more columns of a table to ensure accuracy and reliability of data in the database.

8. What is meant by relation?

A relation is a named, two dimensional table storing logically related data.

MODEL PRACTICE QUESTIONS:

1. Which command is used to add new column in existing table?
2. Which clause is used to search for NULL values in any column?
3. Which command is used to see information like name of columns, data type, size
4. Which clause is used for pattern matching? What are the 2 main characters used for matching the pattern?
5. Which clause is used to see the output of query in ascending or descending order?
6. Which clause is used to eliminate the duplicate rows from output?
7. Which command is used to remove the table from database?
8. Which option of ORDER BY clause is used to arrange the output in descending order?

9. Meetali is a database programmer, She has to write the query from EMPLOYEE table to search for the employee who are getting any commission, for this she has written the query as:

    SELECT * FROM EMPLOYEE WHERE commission=null;

    But the query is not producing the correct output, help Raj and correct the query so that he gets the desired output.

10. Raj is a database programmer, He has to write the query from EMPLOYEE table to search for the employee who are not getting any commission, for this he has written the query as: SELECT * FROM EMPLOYEE WHERE commission=null;
    But the query is not producing the correct output, help Raj and correct the query so that he gets the desired output.

11. Deepika wants to remove all rows from the table BANK. But he needs to maintain the structure of the table. Which command is used to implement the same?

12. While creating table 'customer', Rahul forgot to add column 'price'. Which command is used to add new column in the table. Write the command to implement the same.

13. Observe the given Table TEACHER and give the output of question (i) and (ii)

TEACHER_CODE	TEACHER_NAME	DOJ
T001	ANAND	2001-01-30
T002	AMIT	2007-09-05
T003	ANKIT	2007-09-20
T004	BALBIR	2010-02-15
T005	JASBIR	2011-01-20
T006	KULBIR	2008-07-11

(i)   SELECT TEACHER_NAME,DOJ FROM TEACHER WHERE TEACHER_NAME LIKE
        "%l%";
(ii)   SELECT * FROM TEACHER WHERE DOJ LIKE "%-09-%";

14. Write SQL QUERIES for q no 1 to 4

TABLE: TRIP

NO	NAME	TDATE	KM	TCODE	NOP
11	Tanish Khan	2015-12-13	200	101	32
13	Danish Sahai	2016-06-21	100	103	45
15	Ram Kumar	2016-02-23	350	102	42
12	Fen Shen	2016-01-13	90	102	40
17	Aan Kumar	2015-02-10	75	104	2
14	Veena	2016-06-28	80	105	4
16	Rajpal Kirti	2016-06-06	200	101	25

1.To display NO, NAME, TDATE from the table TRIP in descending order of NO.

2.To display the NAME of the drivers from the table TRIP who are traveling by transport vehicle with code 101 or 103.

3.To display the NO and NAME of those drivers from the table TRIP who travelled between '2015-02-10' and '2015-04-01'.

4.To display all the details from table TRIP in which the distance travelled is more than 100 KM in ascending order of NOP

ANSWERS: 1. Multiple Choice Questions (MCQ)

1	**D**	2	**A**	3	**B**	4	**B**
5	**A**	6	**B**	7	**C**	8	**B**
9	**A**	10	**B**	11	**A**	12	**B**
13	**D**	14	**B**	15	**A**	16	**C**
17	**D**	18	**B**	19	**C**	20	**B**
21a)	**(ii)**	21b)	**(iii)**	21c)	**(iii)**	21d)	**(ii)**
21e)	**(ii)**	22	**B**	23	**C**	24	**C**

Answers Fill in the blanks:

1	Database	2	DBMS	3	Data integrity
4	Consistency	5	Relational Database Management System	6	Interrelated data
7	Table	8	Tuple	9	Primary key
10	Meta – data	11	Query	12	Domain
13	Foreign key				

ANSWER KEY WORKSHEET1 :

1. The column hobby may have NULL values, when we give count(colname) it ignores null values while count(*) will count all duplicate and NULL values. therefore two statements may give different values.

2. 3
   1

3. I) 5300
   II) NULL

4. Yes , as no of records =20 , students scoring <100 = 15. ; hence the students scoring greater than equal to 100 will be 20-15 =5. As all the three statements mentioned use count(*) as the count function.

5. i) select area,count(*) from salespersons group by area;
   ii) North   2

South   2

6. I) 132000
   II) F   42000

       M   33000

   III) F   3

       M   4

7. i) 15 rows and 6 columns
   ii) custID

8. i) select Custno,CustAddress,setName from customer c,handset h where
   c.setNo=h.setName;
   ii) select Custno,CustAddress,setName from customer c,handset h where
   c.setNo=h.setName and h.setName like 'Nokia%';

   iii) N2 Nokia 3G

       B1 Blackberry

9. I) select patNo,PatName,DocName from Patient p,doctor d where
   p.docID=d.docID;
   II) select patNo,PatName,DocName from Patient p,doctor d where
   p.docID=d.docID and OPD_Days="MWF";

ANSWER KEY FOR WORKSHEET2 :

1.

```
 import mysql.connector

 mydb=mysql.connector.connect(host="localhost",user="root",passwd="syste

 m",database="sales") mycursor=mydb.cursor()

 mycursor.execute("CREATE TABLE SALESMAN  (NAME VARCHAR(20),CODE INT

 ,ADDRESS VARCHAR(20), COMMISSION DEC,SALARY FLOAT);")
```

2.

```
 import mysql.connector

 conn=mysql.connector.connect(host="localhost",user="root",passwd="syste

 m",database="DB") c=conn.cursor()

 c.execute("select * from student")

 r=c.fetchone()

 while r is not None:
      print(r)
```

```
            r=c.fetchone()
        conn.close()
```

3.

```
    import mysql.connector
    mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
    ",database="DB") mycursor=mydb.cursor()
    mycursor.execute("DELETE FROM EMP WHERE AGE>60
    ") mydb.commit()
    print(mycursor.rowcount,"RECORD DELETED")
    mydb.close()
```

4. 165000

5. .{ } and fetchone()

6. con.commit() function is missing in the python code

7. con.is_connected()

8. fetchall() function is used to fetch all the records from the cursor in the form of tuple. fetchone()isusedtofetchonerecordatatime.Subsequentfetchone()willfetch nextrecords. If no more records to fetch, it returnsNone.

9. import mysql.connector

conn=mysql.connector.connect(host="localhost",user="root",passwd="system",datab

ase="com")

```
        c=conn.cursor()
        c.execute("select * from emp where id>10")
        r=c.fetchone()
        while r is not None:
            print(r)
            r=c.fetchone()
        conn.close()
```

10.

```
    import mysql.connector
    mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
    ",database="DB") mycursor=mydb.cursor()
```

```
s= input("enter the name")
mycursor.execute("delete from emp where name ='{}')".format(s)
 mydb.commit()
```

11.
```
 import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="system
",database="school") mycursor=mydb.cursor()
 sql="select * from student"
 mycursor.execute(sql)
 recs=mycursor.fetchall()
 count=0
 for r in recs:
        count+=1
        print(r)
 print("total no of records",count)
```

12. 1011 ,"Euphoria"   599.00

ANSWER KEY FOR WORKSHEET3 (Fill in the blanks)

1.database cursor

2.database connection.

3. execute()

4.resultset

5.mysql.connector

ANSWER KEY FOR WORKSHEET4   (MCQ)

1. b)fetchtwo()

2. b)fetchone()

3. c)commit()

4. b)execute()

5. b)connection object

Answers-MODEL PRACTICE QUESTIONS

1. ALTER TABLE

2. IS NULL

3. DESC

4. LIKE
   % (percent) and _ (underscore)

5. ORDER BY

6. DISTINCT

7. DROP TABLE

8. DESC

9. SELECT * FROM EMPLOYEE WHERE commission **IS NOT** null;

10. SELECT * FROM EMPLOYEE WHERE commission **IS** null;

11. DELETE FROM BANK.

12. ALTER TABLE CUSTOMER ADD PRICE FLOAT;

13.

(i)**TEACHER_NAME**   **DOJ**

```
AMIT                                2007-09-05
ANKIT                               2007-09-20
BALBIR                                 2010-02-15
JASBIR                     2011-01-20
KULBIR                     2008-07-11
```

(ii)

TEACHER_CODE   **TEACHER_NAME**   **DOJ**

```
T002                    AMIT                   2007-09-05
T003                    ANKIT                  2007-09-20
```

14.

1.SELECT NO,NAME,TDATE FROM TRIP ORDER BY NO DESC;

2. SELECT NAME FROM TRIP WHERE TCODE=101 OR TCODE=103;

3. SELECT NO,NAME FROM TRIP WHERE TDATE BETWEEN '2015-02-10' AND

'2015-04-01';

4. SELECT * FROM TRIP WHERE KM >100 ORDER BY NOP;

MAX MARKS: 70   TOTAL TIME : 3 hrs

General Instructions:

1.This question paper contains five sections, Section A to E.

2. All questions are compulsory.

3. Section A have 18 questions carrying 01 mark each.

4. Section B has 07 Very Short Answer type questions carrying 02 marks each.

5. Section C has 05 Short Answer type questions carrying 03 marks each.

6. Section D has 03 Long Answer type questions carrying 05 marks each.

7. Section E has 02 questions carrying 04 marks each. One internal choice is given in Q34 against part c only.

8. All programming questions are to be answered using Python Language only.

Part A
Section 1 [18 marks] (1x18)(attempt any 18)

1.	Which of the following symbols are used for comments in Python? **(A)** // (B) & (C) /**/ (D) #	1
2.	Suppose str="computer science with python" .What will be the output of print(type(str)) (a)int (b) bool (c) string (d)str	1
3.	The RDBMS terminology for a row is (a) Tuple (b) relation (c) attribute (d) degree	1
4.	_____Spans over less than a Kilometer a)MAN b)LAN c)WAN d)All of the above	1
5.	The act which governs the cyber transactions in India is_____ a)IT act 2000 b)IT act 2008 c)IT act 2003 d)None of these	1
6.	A network device used to divide a single computer network into various sub-networks . i)router ii)switch ii)hub iv)R	1
7.	With SQL, how do you select all the records from a table named "Persons" where the value of the column "FirstName" ends with an "a"? a) SELECT * FROM Persons WHERE FirstName='a' b) SELECT * FROM Persons WHERE FirstName LIKE 'a%' c) SELECT * FROM Persons WHERE FirstName LIKE '%a' d) SELECT * FROM Persons WHERE FirstName='%a%'.	1

8.	Which of the following is not a DDL command? a) UPDATE b) TRUNCATE c) ALTER d) None of the Mentioned	1
9.	To include the use of functions which are present in the random library, we must use the option: a) import random b) random.h c) import.random d) random.random	1
10.	How many values can be returned by a function in python? a) 0 b) 1 c) more than one d) 2	1
11.	print (id(x)) will print_____. 1. Value of x 2. Datatype of x 3. Size of x 4. Memory address of x	1
12.	Which of the following command is used to change the VALUES OF rows that already exist in a table? 1. Insert. 2. Union. 3. Update. 4. Select	1
13.	Give the output: my_data = (1, 2, "Kevin", 8.9) print (my_data[-3]) 1. 8.9 2. "Kevin". 3. 1 4. 2	1
14.	Suppose list1 is [1, 3, 2], What is list1 * 2 ? a) [2, 6, 4]. b) [1, 3, 2, 1, 3]. c) [1, 3, 2, 1, 3, 2] . d) [1, 3, 2, 3, 2, 1]	1
15.	The readlines() method returns a) str b) a list of lines c) a list of single characters d) a list of integers	1
16	To write data into CSV from python console, which of the following function is correct? a) csv.write(file) b) csv.writer(file) c) csv.Write(file) d) csv.writerow()	1
17	**Statement (A) :** A function can perform certain functionality **Statement (B)** : A function must return a result value a) Statement A is correct b) Statement B is correct c) Statement A is correct but Statement B is not correct d) Both are incorrect	1

18	Ms. Suman is working on a binary file and wants to write data from a list to a binary file. Consider list object as l1, binary file suman_list.dat, and file object as f. Which of the following can be the correct statement for her? a) f = open('sum_list','wb'); pickle.dump(l1,f) b) f = open('sum_list','rb'); l1=pickle.dump(f) c) f = open('sum_list','wb'); pickle.load(l1,f) d) f = open('sum_list','rb'); l1=pickle.load(f)	1

Section B [14 marks] [2x7=14]
Answer All questions

19	Evaluate the following expressions:
	
	   a) 6+7*4+2**3//5-8
	   b) 8<5 or no 19<=20 and 11<4
		2

20	Write down the fullform of : POP b) TCP/IP c) WWW d) HTTPS	2
21	Differentiate between Candidate Key and Primary Key in the context Relational Database Mode	2

22	What will be the output of the following code?
	       a=[1,2,3,4]
	       s=0
	       for a[-1] in a:
	             print(a[-1])
	             s+=a[-1]
	       print('sum=',s)
		2

23	Difference between ALTER & UPDATE commands.	2
24	Smridh has recently changed his school so he is not aware of the people, but someone is posting negative , demeaning comments on his social media profile. He is also getting repeated mails from unknown people. Every time he goes online, he finds someone chasing him online. i. Smridh is a victim of .... ii. The act of fraudulently acquiring someone's personal and private information, such as online account names, login information and passwords is called as	2

25	In the table Loan below
	    (a) Identify the candidate key(s) from the table Garment.
	    (b) What is the cardinality and degree of the table?
	
	Table: GARMENT
	
		GCODE	GNAME	SIZE	COLOUR	PRICE

111	Tshirt	XL	Red	1400.00
112	Jeans	L	Blue	1600.00
113	Skirt	M	Black	1100.00
114	Jacket	XL	Blue	4000.00
115	Trousers	L	Brown	1500.00
116	LadiesTop	L	Pink	1200.00		2
---	---	---

Section C [15 Marks] [3x5]
Answer All questions

26	Vedika has created a dictionary containing names and marks as key-value pairs of 5 students. Write a program, with separate user-defined functions to perform the following operations: Push the keys (name of the student) of the dictionary into a stack, where the corresponding value (marks) is greater than 70. Pop and display the content of the stack. The dictionary should be as follows: d={"Ramesh":58, "Umesh":78, "Vishal":90, "Khushi":60, "Ishika":95} Then the output will be: Umesh Vishal Ishika	3
27.	A department is considering to maintain their worker data using SQL to store the data. As a database administer, Karan has decided that : Name of the database - Department Name of the table - WORKER The attributes of WORKER are as follows: WORKER_ID - character of size 3 FIRST_NAME – character of size 10 LAST_NAME– character of size 10 SALARY - numeric JOINING_DATE – Date DEPARTMENT – character of size 10 I)Identify the attribute best suitable to be declared as a primary key II) Karan wants to increase the size of the FIRST_NAME column from 10 to 20	3

characters. Write an appropriate query to change the size.

III) Karan wants to remove all the data from table WORKER from the database Department.

Which command will he use from the following:

   i) DELETE FROM WORKER;
   ii) DROP TABLE WORKER;
   iii) DROP DATABASE Department;
iv) DELETE * FROM WORKER

28.

Ashok Kumar of class 12 is writing a program to create a CSV file "cust.csv" with custid, custname and mobile no and search custname and delete the record. He has written the following code. As a programmer, help him to successfully execute the given task.

```
import _____      # LINE1
record = list()
custname= input("Please enter a customer name to delete:")
with open('cust.csv', 'r') as f:
data = csv._____(f)   # LINE2
for row in data:
        record.append(row)
        for field in row:
                if field == custname:
                        record.____(row)  #LINE3
with open('cust.csv', 'w') as f:
    writer = csv.writer(f)
    writer.writerows(record
```

A) Name the module he should import in Line 1.

b) Write a code to read the fields (column heading) once from fields list in Line2.

(c) Write a code to delete the row from row list in Line3.

3

29.

Write SQL commands for(a) to (b) and write the outputs for (C) on the basis of table GRADUATE

TABLE : GRADUATE

S No	NAME	Stipend	Subject	Average	Div
1	Karan	400	Physics	68	1
2	Divakar	450	Computers	68	1
3	Divya	300	Chemistry	62	2
4	Arun	350	Physics	63	1
5	Sabina	500	Mathematics	70	1
6	John	400	Chemistry	55	2
7	Robert	250	Physics	64	1
8	Rubina	450	Mathematics	68	1
9	Vikas	500	Computers	62	1
10	Mohan	300	Mathematics	57	2

a) List the names of those students who obtained DIV 1 sorted by NAME .

2+1

	b)Display a report, listing NAME , STIPEND , SUBJCT and amount of stipend received in a year assuming that the STIPEND is paid every month. C.) Give the output of the following SQL statements based on table GRADUATE : (i) Select MIN(AVERAGE) from GRADUATE where SUBJECT="PHYSICS"; (ii)Select SUM(STIPEND) from GRADUATE where DIV=1;	
30	A) Write a function countmy() in Python to read the text file "DATA.TXT" and count the number of times "my" occurs in the file. For example, if the file "DATA.TXT" contains "This is my website. I have displayed my preferences in the CHOICE section." - the countmy() function should display the output as: "my occurs 2 times"Or Write a method/function DISPLAYWORDS() in python to read lines from a text file STORY.TXT, and display those words, which are less than 4 characters. Or A) Write a method/function DISPLAYWORDS() in python to read lines from a text file STORY.TXT,and display those words, which are less than 4 characters	3

Section D [15 Marks]
[5x3]

31.	Indian School, in Mumbai is starting up the network between its different wings. There are four Buildings named as SENIOR, JUNIOR, ADMIN and HOSTEL as shown below: 	ADMIN TO SENIOR	200m
ADMIN TO JUNIOR	150m
ADMIN TO HOSTEL	50m
SENIOR TO JUNIOR	250m
SENIOR TO HOSTEL	350m
JUNIOR TO HOSTEL	350m | **The distance between various buildings is as follows** | SENIOR	130
JUNIOR	80
ADMIN	160
HOSTEL	50	 1. Suggest the cable layout of connections between the buildings. (1) 2. Suggest the most suitable place (i.e., building) to house the server of this school, provide a suitable reason. (1) 3. Suggest the placement of the following devices with justification. (2)	5

	a. Repeater b.Hub/Switch
	
	4. The organisation also has inquiry office in another city about 50-60 km away in hilly region. Suggest the suitable transmission media to interconnect to school and inquiry office out of the following : (1)
	
	    a) Fiber optic cable
	    b) Microwave
	    c) Radiowave	

32.	**Give Output of :**
	
	def Change (P, Q = 30) :
	    P = P + Q
	    Q = P - Q
	    print (P,"@",Q)
	    return P
	R =150
	S= 100
	R=Change(R, S)
	print(R,"@",S)
	S=Change (S)
		5
		(2+3)

1. **The books table of test database contains the records shown below:-**

Title	ISBN
Die to Live	78127873915
Again?	23686286243
Ushakaal	12678987036
Ushakiran	42568987036

What will be the output produced by following code:

```
import mysql.connector as sqltor.
conn = sqltor.connect (host = "localhost", user = "learner", passwd = "fast",
database = "test")
cursor = conn.cursor()
cursor.execute("SELECT * FROM books")
row = cursor.fetchone()
while row is not None:
    print (row)
    row = cursor.fetchone()
```

33	A. Considering the following definition of dictionary MULTIPLEX, write a method in python to search and display all the content in a pickled file CINEMA.DAT, where MTYPE key of the dictionary is matching with the value "Comedy". MULTIPLEX = {'MNO': _____ , 'MNAME": _____ , 'MTYPE': _____} Or Following is the structure of each record in a data file named "phonebook.DAT". {"name": value, "phone": value} Write a program to edit the phone number of "Arvind" infile "phonebook.dat". If there is no record for "Arvind", report error.	5
34	Write SQL commands for the queries (i) to (iii) and output for (iv) & (vii) based on a **COMPANY** <table><tr><th>CID</th><th>NAME</th><th>CITY</th><th>PRODUCTNAME</th></tr><tr><td>111</td><td>SONY</td><td>DELHI</td><td>TV</td></tr><tr><td>222</td><td>NOKIA</td><td>MUMBAI</td><td>MOBILE</td></tr><tr><td>333</td><td>ONIDA</td><td>DELHI</td><td>TV</td></tr><tr><td>444</td><td>SONY</td><td>MUMBAI</td><td>MOBILE</td></tr><tr><td>555</td><td>BLACKBERRY</td><td>MADRAS</td><td>MOBILE</td></tr><tr><td>666</td><td>DELL</td><td>DELHI</td><td>LAPTOP</td></tr></table> **CUSTOMER** <table><tr><th>CUSTID</th><th>NAME</th><th>PRICE</th><th>QTY</th><th>CID</th></tr><tr><td>101</td><td>ROHAN SHARMA</td><td>70,000</td><td>20</td><td>222</td></tr><tr><td>102</td><td>DEEPAK KUMAR</td><td>50,000</td><td>10</td><td>666</td></tr><tr><td>103</td><td>MOHAN KUMAR</td><td>30,000</td><td>5</td><td>111</td></tr><tr><td>104</td><td>SAHIL BANSAL</td><td>35,000</td><td>3</td><td>333</td></tr><tr><td>105</td><td>NEHA SONI</td><td>25,000</td><td>7</td><td>444</td></tr><tr><td>106</td><td>SONAL AGGARWAL</td><td>20,000</td><td>5</td><td>333</td></tr><tr><td>107</td><td>ARUN SINGH</td><td>50,000</td><td>15</td><td>666</td></tr></table> table COMPANY and CUSTOMER I) Identify the most appropriate Primary key for Tables Company and Customer. Ii) To display those company name which are having prcze less than 30000. iii a.To increase the price by 1000 for those customer whose name starts with S? b) What is the cardinality and degree of table customer? Or Iii)a) Delete the records from table customer whose name has KUMAR. B. Insert a new record in table COmpany where CID : 777, Name : APPLE City KOCHI and PRODUCTNAME is LAPTOP	4

35	Aradhana is creating a binary file student.dat that has structure (rollno,name,class,percentage). She wrote a program to updating a record in the file requires roll number to be fetched from the user whose name is to be updated. She has few doubts in the code. Help her to complete the task. She uses intermediate file for working temp.dat	4

```
 Import_____   #STATEMENT 1
import os
f1 = open('student.dat','rb')
f2=open("temp.dat","_____")  #Statement2
r=int(input("enter rollno which you want to search"))
 try:
        while True:
                e = pickle.load(f1)
                if e[0]==r:
                    e[1]=input("enter name")
                     pickle.dump(____) #Statement3
             else:
                  pickle.dump(e,f2)
except:
        f1.close()
        f2.close()
os.remove("student.dat")
os._____("temp.dat","student,dat") #Statement4
```

(i) Which module should be imported in the program? (Statement 1)
(ii) Write the correct statement required to open a temporary file named temp.dat. (Statement 2)
(iii)) Which statement should Aradhana fill in Statement 3 to write the data to the binary filedat
(iv) Statement 4 to write the rename temp.dat to student.dat?

	KENDRIYA VIDYALAYA SANGHATHAN – ERNAKULAM REGION **SAMPLE PAPER-1(SOLUTION) – COMPUTER SCIENCE (083)**	
	Part A **Section 1 [18 marks] (1x18)**	
1.	(a) //	1
2.	(d)str	1
3.	(a) Tuple	1
4.	b)LAN	1
5.	a)IT act 2000	1
6.	ii)switch	1
7.	c) SELECT * FROM Persons WHERE FirstName LIKE '%a'	1
8.	a) UPDATE	1
9.	a) import random	1
10.	c) more than one	1
11.	4. Memory address of x	1
12	3. Update.	1
13.	4. 2	1
14.	c) [1, 3, 2, 1, 3, 2] .	1
15.	b) a list of lines	1
16.	b) csv.writer(file)	1
17	c) Statement A is correct but Statement B is not correct	1
18	a) f = open('sum_list','wb'); pickle.dump(l1,f)	1
	Section B [2x7=14] **Answer All questions**	
19	a) 27 b) False	2
20	a) Post Office Protocol b)Transmission Control Protocol/Internet Protocol c) World Wide Web d) Hypertext Transfer Protocol Secure	2
21	Candidate Key: The columns which can serve as primary key of a table is known as candidate keys. There can be multiple candidate for a relation. Primary Key: Primary key is a field name which identifies rows uniquely. There can be only one primary key for a relation.	2
22	1 2 3 3 Sum=9	2
23	ALTER Command is used to add, delete, modify the attributes of the relations (tables) in the database. UPDATE Command is used to update existing records in a database.	2

24	i)Cyber stalking ii)Phishing	2
25	a) GCODE, GNAME, b) Degree=5 & Cardinality=6	2
| 26 | ```
def push(stk,item):
    stk.append(item)
def Pop(stk):
    if stk==[]:
        return None
    else:
        return stk.pop()
stk=[]
d={"Ramesh":58, "Umesh":78, "Vishal":90, "Khushi":60, "Ishika":95}
for i in d:
    if d[i]>70:
        push(stk,i)
while True:
    if stk!=[]:
        print(Pop(stk),end=" ")
    else:
        break
``` | 3 |
27	I) WORKER_ID II)alter table worker modify FIRST_NAME varchar(20); lll)DELETE FROM WORKER;	3
28.	a) csv .b) reader .c) remove	3
29	A. List the names of those students who obtained DIV 1 sorted by NAME . Ans.: SELECT name FROM graduate WHERE div=1 ORDER BY name; (b)Display a report, listing NAME , STIPEND , SUBJCT and amount of stipend received in a year assuming that the STIPEND is paid every month. Ans.: SELECT name, stipend, subject, stipend *12 FROM graduate; (C) Give the output of the following SQL statements based on table GRADUATE : (i) Select MIN(AVERAGE) from GRADUATE where SUBJECT="PHYSICS"; Ans. MIN(AVERAGE) ---------------------- 63 (ii)Select SUM(STIPEND) from GRADUATE where DIV=1; Ans.: SUM(STIPEND) -------------------- 1000	2+1
| 30 | A)<br>```
def countmy ():
    f = open("DATA.txt", "r")
    count = 0
``` | 3 |

```
            x = f.read()
            word = x.split()
            for i in word :
                    if (i == "my") :
                            count = count + 1
            print ("my occurs", count, "times")

  A. close()
Or

ii) )
def DISPLAYWORDS() :
   file = open("story.txt", "r")
   lst = file.readlines()
   for i in lst :
      word = i.split()
      for j in word :
         if len( j ) < 4 :
             print( j )
   file.close()
print("Word with length smaller than 3 :- \n")
DISPLAYWORDS()
```

	SectionD [15 Marks] [5x3]	
31.	 1. 2. Server can be placed in the ADMIN building as it has the maxium number of computer. 3. (a) Repeater can be placed between ADMIN and SENIOR and ADMIN and JUNIOR building as the distance is more than 80 m. (b) Hub/Switch : can be placed in all building in order to connect the computer within 4. Radiowaves can be used in hilly regions as they can travel through obstacles	5
32	b) 250 @ 150	2+3

	250 @ 100	
	130 @ 100	
	c) (Die to Live 78127873915) (Again? 23686286243) (Ushakaal 12678987036) (ushakiran 42568987036)	

33.	A.) def Search():
	
	   file = open('CINEMA.DAT', "rb")
	
	   try:
	
	     while True:
	
	       MULTIPLEX = pickle.load(file)
	
	       if MULTIPLEX ["MTYPE"] == "Comedy":
	
	         print (MULTIPLEX)
	
	   except EOFError:
	
	     file.close()
	
	Or
	
	B.) Try = 0
	
	f = open("phonebook.det","r")
	
	data = f.readlines()
	
	f.close()
	
	f = open("phonebook.det","w")
	
	name = input("Enter name which you want search :-")
	
	for i in range(len(data)) :
	
	  line = data[i] . split()
	
	  if line[0] == name :
	
	    phone = input("Enter new Phone :-")
	
	    data[i] = name + " " + phone
	
	    Try = 1
		5

```
if Try != 1 :
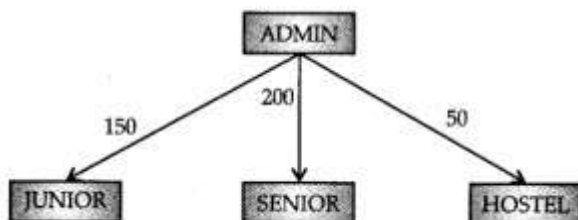
    print("Try again !!!!! ")


for i in range(len(data)) :

  line = data[ i ] . split()

  for j in line :

    f.write( j + "\t")

  f.write("\n")


f.close()
print("Thankyou")
```

	Section E [8 Marks] [4x2]	
34	1)CID for Company and CUSTID for CUtomer II) Select company.Name from company , Customer where company.cid=customer.cid and price <30000 III) a. update customer set price=price+1000 where name like 'S%' b) cardinality : 7 degree : 5 Or III a. delete from Customer where name like " %Kumar%' B) Insert into COMPANY values(777,'APPLE', 'OCI',"LAPTOP')	4
35	(v) pickle (vi) Wb (vii) pickle.dump(e,f2) (viii) .rename()	4

Subject: COMPUTER SCIENCE (083)

Time Allotted: 3 HRS   Max Marks: 70

General Instructions:

1. This question paper contains five sections, Section A to E.
2. All questions are compulsory.
3. Section A have 18 questions carrying 01 mark each.
4. Section B has 07 Very Short Answer type questions carrying 02 marks each.
5. Section C has 05 Short Answer type questions carrying 03 marks each.
6. Section D has 03 Long Answer type questions carrying 05 marks each.
7. Section E has 02 questions carrying 04 marks each. One internal choice is given in Q35 against part c only.
8. All programming questions are to be answered using Python Language only.

QNo.	Section-A	Marks
1	Find the invalid identifier from the following a) sub%marks b)age c)_subname_ d)subject1	1
2	Given the list L=["A", "E", "I", "O", "U"] , write the output of print(L[2:5])	1
3	Which module is required to work with CSV files in Python?	1
4	Identify the invalid logical operator in Python from the following. a) and b) or c) by d) not	1
5	Suppose a tuple K is declared as K = (100, 102, 143, 309), which of the following is incorrect? a)print(K[-1]) b) K[3] =405 c) print(min(K)) d) print(max(K))	1
6	Write a statement in Python to declare a dictionary whose keys are Sub1, Sub2, Sub3 and values are Physics, Chemistry, Math respectively.	1
7	A List is declared as List1=[2,3,5,7,9,11,13] What will be the value of len(List1)	1
8	Name the built-in mathematical function / method that is used to return the smallest integer less than or equal to N.	1
9	Name the protocol that is used to transfer files.	1
10	Ms. Priya is an IT expert. She recently used her skills to access the Admin	1

	password for the network server of Happiest Minds Technology Ltd. and provided confidential data of the organization to its CEO, informing him about the vulnerability of their network security. Out of the following options which one most appropriately defines Ms. Priya? a) Cracker b) Operator c) Hacker d) Network Admin	
11	In SQL, name the clause that is used to sort the records in ascending/descending order of an attribute.	1
12	In SQL, what is the use of IS NOT NULL operator?	1
13	Name the aggregate function to find the average value in SQL.	1
14	Which of the following is not a DDL command? a) UPDATE b)ALTER TABLE c)CREATE TABLE d)DROP TABLE	1
15	Name the transmission media best suitable for difficult terrain like hilly areas.	1
16	Identify the data type of INFO: INFO = ['hello',203,'9',[5,6]] a. Dictionary b. String c. Tuple d. List	1
17	**Assertion (A):-** If the arguments in function call statement match the number and order of arguments as defined in the function definition, such arguments are called positional arguments. **Reasoning (R):-** During a function call, the argument list first contains default argument(s) followed by positional argument(s). 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 the correct explanation for A (c) A is True but R is False (d) A is false but R is True	1
18	**Assertion (A):-** If the arguments in function call statement match the number and order of arguments as defined in the function definition, such arguments are called positional arguments. **Reasoning (R):-** During a function call, the argument list first contains default argument(s) followed by positional argument(s). 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 the correct explanation for A (c) A is True but R is False (d) A is false but R is True	1

	SECTION-B	
19	Evaluate the following expressions: a) 16 // 3 + 3 ** 3 + 15 / 4 - 9 b) x>y or y<z and not x!=z If x, y, z=25, 16, 9	2
20	Differentiate between WiFi and WiMax in context of wireless communication technologies. **OR** Differentiate between Domain name and URL. Illustrate with the help of suitable example.	2
21	Expand the following terms: a. GPRS b. GSM c. WLL d. PPP	2
22	Differentiate between positional parameters and default parameters with suitable example program for each. **OR** How can a function return multiple values? Illustrate with an example program.	2

23	Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code.
	
	for Name in [Aakash, Sathya, Tarushi]
	   IF Name[0]= 'S':
	      print(Name)
		2

24	What are the incorrect output(s) from the given options when the following code is executed? Also specify the minimum and maximum values that can be assigned to the variable VALUE.
	
	import random
	
	VALUE = random.randint (0,3)
	
	SUBJECT=["PHY","CHEM","MATHS","COMP"];
	
	for I in SUBJECT:
	
	  for J in range(1, VALUE):
	
	    print(I, end="")
	
	  print()
		2

Options:

i) PHYPHY	ii) PHY
CHEMCHEM	PHYCHEM
MATHSMATHS	PHYCHEMMATHS
COMPCOMP	
iii) PHY	iv) PHY
CHEMCHEM	CHEM
COMPCOMPCOMP	MATHS
	COMP

25	What do you understand by Alternate Keys in a table? Give a suitable example of Alternate Keys from a table containing some meaningful data.	2

Section- C

26	Write a function Interchange (num) in Python, which accepts a list **num** of integers, and interchange the adjacent elements of the list and print the modified list as shown below: (Number of elements in the list is assumed as even)
	
	Original List:
	  num = [5,7,9,11,13,15]
	After Rearrangement
	  num = [7,5,11,9,15,13]
		3

27	Write a function in Python that displays the **words,** starting with uppercase letter in a file 'legend.txt'.
	  Example: If the "legend.txt" contents are as follows:
	  Diego Maradona, Argentinian soccer legend and celebrated Hand of God scorer dies at 60.
	  The output of the function should be:
	  Diego
	  Maradona,
	  Argentinian
	  Hand
	God
	
	OR
	
	Write a function countdigits() in Python, which should read each character of a text file "marks.txt", count the number of digits and display the file content and the number of digits.
	Example: If the "marks.txt" contents are as follows:
	Harikaran:40,Atheeswaran:35,Dahrshini:30,Jahnavi:48
		3

		The output of the function should be: Harikaran:40,Atheeswaran:35,Dahrshini:30,Jahnavi:48 ('Total number of digits in the file:', 8)	
28		Write the outputs of the SQL queries (i) to (iii) based on the relations Car and Customer given below:	3

Car

Ccode	Cname	Make	Colour	Capacity	Charges
201	Triber	Renault	Yellow	7	1000
203	Altroz	Tata	Black	5	1500
208	Innova	Toyota	Silver	8	3000
209	Harrier	Tata	White	6	2000
212	Duster	Renault	Red	6	2500
217	Ertiga	Suzuki	Grey	7	2300

Customer

Custcode	Custname	Ccode
101	Gopinath	201
102	Ashok	203
103	Harshini	209
104	Vishnu	212

i. Select make, count(*) from Car group by make having count(*)<2;

ii. Select Cname, Make from Car order by charges desc;

iii. Select Custname, Cname from Car R, Customer C where

R.Ccode=C.Ccode:

29	Write a function in Python Push (nums), where **nums** is a list of numbers. From this list push all odd numbers into a stack implemented by using a list. Display the stack if it has at least one element, otherwise display appropriate error message. OR Write a function in Python Popstack (names), where **names** is a stack implemented by a list of names. The function returns the name deleted from the stack.	3
30	Find and write the output of the following Python code: def Shuffle(str1):	3

```
str2=""
for i in range(0,len(str1)-1):
    if(str1[i].islower()):
        str2=str2+str1[i].upper()
    elif str1[i].isupper():
        str2=str2+str1[i].lower()
    elif str1[i].isdigit():
        str2=str2+'d'
    else:
        str2=str2+(str1[1-i])
print(str2)

Shuffle('Pre-Board Exam@2023')
```

	Section-D	
31	Young Minds Ltd. is an educational organization. It is planning to setup its India campus at Chennai with its head office at Delhi. The Chennai campus has 4 main buildings – ADMIN, ENGINEERING, BUSINESS and MEDIA. You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (v), keeping in mind the distances between the buildings and other given parameters.	5

Shortest distances between various buildings :

ADMIN to ENGINEERING	55 m
ADMIN to BUSINESS	90 m
ADMIN to MEDIA	50 m
ENGINEERING to BUSINESS	55 m
ENGINEERING to MEDIA	50 m
BUSINESS to MEDIA	45 m
DELHI Head Office to CHENNAI Campus	2175 km

Number of Computers installed at various buildings are as follows :

ADMIN	110
ENGINEERING	75
BUSINESS	40
MEDIA	12
DELHI Head Office	20

(i) Suggest the most appropriate location of the server inside the CHENNAI campus (out of the 4 buildings), to get the best connectivity for maximum no. of computers. Justify your answer.

(ii) Suggest the topology and draw the cable layout to efficiently connect various buildings within the CHENNAI campus.

(iii) Which hardware device will you suggest to be procured by the company to minimize the transmission loss?

(iv) Which will be the most suitable wireless communication medium to connect Chennai campus with its Delhi head office?

(v) Which of the following will you suggest to establish the online face-to-face

communication between the people in the Admin Office of CHENNAI Campus and DELHI Head Office?

    (a) Cable TV

    (b) Email

    (c) Video Conferencing

    (d) Text Chat

32	Write the SQL commands for the following questions (i) to (v) based on the relations Car and Customer given below:	5

Car

Ccode	Cname	Make	Colour	Capacity	Charges
201	Triber	Renault	Yellow	7	1000
203	Altroz	Tata	Black	5	1500
208	Innova	Toyota	Silver	8	3000

209	Harrier	Tata	White	6	2000	
212	Duster	Renault	Red	6	2500	
217	Ertiga	Suzuki	Grey	7	2300	

Customer

Custcode	Custname	Ccode
101	Gopinath	201
102	Ashok	203
103	Harshini	201
104	Vishnu	212

(i) To display the Names and Charges of all the Silver coloured cars.
(ii) To display the non duplicate car codes in the customer table.
(iii) To display the Minimum and Maximum car charges.
(iv) To give a discount of 10% in the car charges for existing customers (who are   in the customer table).
(v) To display Name and Make of cars whose charges is in the range 2000 to 3000 (both inclusive).

| 33 | A binary file "vehicle.dat" has structure [RegNo, Type, Make, Year].
    a. Write a user defined function AddVahan() to input data for a vehicle and add to "vehicle.dat" file.
    b. Write a function CountVahan(Type) in Python which accepts the Type of the vehicle as the parameter and count and return the number of vehicles of the given Type.

OR

A binary file "player.dat" has structure (PlayerId, Name, Team, StrikeRate). Write a function ShowPlayer() in Python that would read contents of the file and display the details of those players whose Team is "India" and StrikeRate is above 50. Also display the total number of such players. | 5 |

| | **SECTION E** | |
| 34 | A Book store **Current Books** is planning to store their book details in a database using SQL. As a database administrator, Poorvekka has decided that:

  (a) Name of the database - CB | 4 |

(b) Name of the table - Collections

(c) The attributes of Collections are as

follows:

BookNo - Numeric

BookName – Character of size 25

Price – Numeric

Quantity – Numeric

Table : Collections			
BookNo	**BookName**	**Price**	**Quantity**
1647	The Lowland	399	75
5241	The Inheritance Of Loss	555	44
3546	The Guide	641	60
4541	Untouchable	529	53
5025	Train to Pakistan	643	73
6783	Godan	341	97
7614	The God Of Small Things	555	48

(d) Identify the attribute best suitable to be declared as a primary key,

(e) Write the degree and cardinality of the table **Collections**.

(f) Write SQL command to increment the quantity by 20 wherever quantity is below 50.

(d) Poorvekka wants to remove the entire data from table

Collections. Which command will she use from the following:

    a. DELETE FROM Collections;

    b. DELETE Collections;

    c. DROP DATABASE CB;

    d. DELETE * FROM Collections;

35	Atul Prakash of Class 12 is writing a program to create a CSV file "students.csv" which will contain student name and admission number for some entries. He has written the following code. As a programmer, help him to successfully execute the given task. import_____ # Line 1 def Addstudents(Name, Admno): # to write / add data into the CSV	4

```
        f=open('students.csv','__')          # Line2

        writerObj = csv.writer(f)

        writerObj.writerow([Name,Admno])

        f.close()

#csv file reading code

def Retrievestudents():# to read data from CSV

    with open(' students.csv','r') as fobj:

            readerObj=csv._____(fobj)                  # Line

            3for row in readerObj:

                print (row[0],row[1])

    fobj.close()                                              # Line4


AddStudents("Raghava", "2541")

AddStudents ("Pooja","3411")

AddStudents("Krutika","2218")

Retrievestudents ()                                          #Line 5
```

(a) Name the module to be imported in Line 1.

(b)Which mode Atul should open the file to add data.

(c) Fill in the blank in Line 3 to read data from a csv file.

(d) Is Line 4 mandatory? Justify your answer.

Subject: COMPUTER SCIENCE (083)

MARKING SCHEME

	Section - A	
1	a) sub%marks	1
2	["I", "O", "U"]	1
3	Module "csv"	1
4	c) by	1
5	b) K[3] =405 (as tuple is immutable)	1
6	{"Sub1" : "Physics" , "Sub2" : "Chemistry" , "Sub3": "Math"}	1
7	7	1
8	floor() from math module	1
9	FTP (File Transfer Protocol)	1
10	c) Hacker	1
11	ORDER BY	1
12	To check for values which are not defined as NULL	1
13	AVG	1
14	a) UPDATE	1
15	Microwave / Radio wave	1
16	d. List	1
17	Ans: (c) A is True but R is False	1
18	Ans: (a) Both A and R are true and R is the correct explanation for A	1
	SECTION B	
19	a) 26.75 b) True	1 1
20	**Wi-Fi** is the name of a wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections. **WiMax** (**World wide Interoperability for Microwave Access**) is a wireless industry coalition dedicated to the advancement of IEEE 802.16 standards for broadband wireless access (BWA) networks. **OR** **Domain Name:** A domain name is a unique name that identifies a particular website and represents the name of the server where the web pages reside. **URL**: The Uniform Resource Locator is a means to locate resources such as web pages on the Internet. URL is also a method to address the web pages on the Internet.	2

	Example: **http://cbseacademic.nic.in/web_material/CurriculumMain22/CS2022-23.pdf** is an **URL** where **cbseacademic.nic.in** is the domain name.	
21	a. GPRS – General Packet Radio Services b. GSM – Global System for Mobile communications c. WLL – Wireless Local Loop/Wireless in Local Loop d. PPP – Point to Point Protocol	2

22	Positional Parameter - When function calls are made, there is a one to one correspondence between the argument and the parameter based on the order/position in which the argument appears in the function.
	Ex:
	def fun1(x,y,z):
	  m= x/y-z
	  print(m)
	a,b,c = 5,2,3
	fun1(a,b,c)
	fun1(4,b,b)
	#fun1(a,b) #Error as the third argument is missing
	
	Default parameters - Usually when a function is called, the number of arguments must match exactly the number of parameters, otherwise python gives an error. But there is an exception, if a function is defined with a default parameter, then the function call can have less number of arguments than the number of parameters in the function header.
	Ex:
	def fun1(x,y,z=2): # z is default parameter
	   m= x/y-z
	   print(m)
	#def fun2(m=2,n,p): # error default arguments must be rightmost
	# return m+n+p
	a,b,c= 1,2,3
	fun1(a,b,c)
	fun1(a,b)
	#fun1(b) #error as at least two parameters must be passed
	 OR
	A function can return multiple values which is written after the return statement and the values are separated by commas. The multiple return values are returned as a tuple object to the statement that made the function call.
	
	Ex:
	def fun1(x,y,z):
	   return x+y,y+z,z+x
	a,b,c= 3,5,9
	
	#multiple returned values accepted as a tuple
	m = fun1(a,b,c)
		2

```
    print(m)

    #multiple returned values accepted in multiple variables
    p,q,r=fun1(10,11,12)

     print(p,q,r)
```

23	**CORRECTED CODE:** ```for Name in ['Aakash', 'Satya', 'Tarushi']:\n if Name[0]=='S':\n print(Name)```	2
24	Minimum VALUE = 0 Maximum VALUE = 3 Options (ii) & (iii) are incorrect.	2
25	Alternate Keys are candidate keys which are not selected as Primary Key. Table: STUD {table} In the above table STUD, AdmNo and RollNo are candidate keys, If RollNo is selected as Primary Key then AdmNo will be the alternate key.	2

Table: STUD

AdmNo	RollNo	Name
1236	101	Amarnath
1457	102	Piyush
1836	103	Swetha

SECTION C

26	```def Interchange(num):\n for i in range(0,n,2):\n num[i], num[i+1] = num[i+1], num[i]\n print(num)\n\nnum=[5,7,9,11,13,15]\nn=len(num)\nif n%2==0:\n Interchange(num)``` **Note : Any correct code giving the same result is also accepted**	3
27	```def Disp_upper_first():\n word=""\n f=open("legend.txt","r")\n line=f.read()\n word=line.split()\n for i in word:\n if i[0].isupper():```	3

```
        print(i)
    f.close()
Disp_upper_first()
```
Note : Any correct code giving the same result is also accepted

OR

```
def countdigits():
    c=0
    f=open("marks.txt","r")
    line=f.read()
    print(line)
    for i in line:
        if i.isdigit():
            c+=1
    print("Total number of digits in the file:",c)
    f.close()
countdigits()
```
Note : Any correct code giving the same result is also accepted

---

28   **3**

i.

Make	Count(*)
Toyota	1
Suzuki	1

ii.

Cname	Make
Innova	Toyota
Duster	Renault
Ertiga	Suzuki
Harrier	Tata
Altroz	Tata
Triber	Renault

iii.

Custname	Cname
Gopinath	Triber
Ashok	Altroz
Harshini	Harrier
Vishnu	Duster

---

29   **3**

```
def Push(nums):
    li =[]
    for i in range(0,len(nums)):
        if nums[i]%2!=0:
            li.append(nums[i])
    if len(li) == 0:
```

```
        print('Stack is empty!!')
    else:
      print(li)
Push([10,15,20,25,30,35])
```
Note : Any correct code giving the same result is also accepted

                                    OR

```
def popStack(names) :
  L = len(names)
  if L==0:
     print("Stack Underflow")
  else:
     val = names[L-1]
     names.pop(L-1)
  return val
res=popStack(['Harikaran','Balaji','Nikhil','Cathrine'])
print('Value returned:',res)
```
Note : Any correct code giving the same result is also accepted

30	OUTPUT : pRE2bOARDxeXAMaddd	**3**
	SECTION -D	
31	(i) Most suitable place to install the server is ADMIN, as this building has maximum number of computers. (ii)Topology: STAR Cable layout: (iii) Repeater (iv) Satellite Link (v) (c) Video Conferencing	5
32	(i) Select Cname, Charges from Car where Colour='silver'; (ii) Select distinct Ccode from customer; (iii) Select min(Charges), max(Charges) from Car; (iv) Update Car set Charges=Charges - Charges*0.1 from Car R, Customer C where R.Ccode=C.Ccode; (v) Select Cname, Make from Car where Charges between 2000 and 3000;	5

33	import pickle
	
	def AddVahan():
	
	  f1= open("vehicle.dat", "ab")
	
	  RegNo = input("Enter the vehicle registration number: ")
		5

```python
    Type = input("Enter the vehicle type: ")
    Make = input("Enter the manufacturer name: ")
    Year = int(input("Enter the year of manufacturing: "))
    rec = [RegNo, Type, Make, Year]
    pickle.dump(rec, f1)
    f1.close()
def  CountVahan(Type):
    f1 = open("vehicle.dat", "rb")
    count = 0
    try:
        while True:
            rec = pickle.load(f1)
            if Type == rec[1]:
                count = count + 1
    except:
        f1.close()
    return count
```

OR

```python
import pickle
def ShowPlayer():
    f1 = open("player.dat", "rb")
    count = 0
    try:
        while True:
            rec= pickle.load(f1)
            if rec[3] >50 and rec[2] == "India":
                print(rec [0], rec [1], rec [2], rec [3],sep="\t")
                count +=1
    except:
        f1.close()
    print("Number of Indian players with strike rate more than 50=", count)
```

SECTION E		
34	(a) BookNo	4
	(b) Degree=4 Cardinality =7	
	(c) UPDATE collections SET quantity = quantity + 20 WHERE quantity < 50;	
	(d) DELETE FROM Collections;	
35	(a) Line 1 :import csv	4
	(b) Line 2 :f=open('students.csv','<u>a</u>')	
	(c) Line 3 :readerObj=csv.reader(fobj)	
	(d) Line 4: Not mandatory, as we have opened the file using "with" operator, it closes automatically.	

KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION
SAMPLE QUESTION PAPER-3(SOLVED)
COMPUTER SCIENCE
CLASS: XII

Max.Marks:70   **Time Allowed:3 hours**

General Instructions:
1. **This question paper contains five sections, Section A to E.**
2. **All questions are compulsory.**
3. **Section A have 18 questions carrying 01 mark each.**
4. **Section B has 07 Very Short Answer type questions carrying 02 marks each.**
5. **Section C has 05 Short Answer type questions carrying 03 marks each.**
6. **Section D has 03 Long Answer type questions carrying 05 marks each.**
7. **Section E has 02 questions carrying 04 marks each. One internal choice is given in Q34 against part c only.**
8. All programming questions are to be answered using Python Language only.

Q.NO	PART A	Marks
	SECTION 1 **Attempt any 15 questions from question no 1 to 21.**	
1	Which of the following is not a relational operator a) > b)<= c)!= d)=	1
2	Identify the data type of result of expression 10<5 a)bool b)int c)float d)None	1
3	Which is not a type of tokens from the following. a)keyword b) literals c)Operators d)Class	1
4	Identify valid declaration of tuple a)T={'a','b','c','d'} b) T='a','b','c','d' c)D=('a','b','c','d') d) both b and c	1
5	Write the module that need to be imported to execute the function dump(): a)random b)csv c)mysql.connector d)pickle	1
6	Given the list L=[-1,4,6,-5] ,write the output of print(L[-1:-3]) a)[4,6,-5] b)[] c)[6,-5] d)error	
7	What will be the output of following: x,y=10,5 x,y=y,x print(x,y) a) 10,5 b)5 10 c) 5,10 d)10 5	1
8	A function can return ------number of values a)0 b)None c)Many d)2	1
9	The default file open mode is-----------mode a)r b)r+ c)w d)a	1
10	Which of the following is/are mutable data type? a)int b)string c)list d)tuple	1
11	Which operator in SQL is used to compare a value to a specified list of values a)BETWEEN b)= c)IN d)ALL	1

12	Which of the following is not an aggregate function? a)MIN()　　b)SUM()　　c)UPPER()　　d)COUNT()	1
13	Which keyword is used to eliminate duplicate values in an SQL select query? a)unique　　b)distinct　　c)key　　d)all	1
14	Which of the following network device is a broadcasting device a)switch　　b)hub　　c)gateway　　d)router	1
15	What is the degree of the following relation? <table><tr><td>slno</td><td>dateofadmn</td><td>class</td></tr><tr><td>1</td><td>2022-06-05</td><td>V</td></tr><tr><td>2</td><td>2022-08-23</td><td>VIII</td></tr></table> a)3　　b)5　　c)2　　d)1	1
16	If all devices are connected to a central hub, then topology is called a)tree topology　　b)bus topology　　c)star topology　　d)mesh topology	1
	Q17 and 18 are ASSERTION AND REASONING based questions. 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 the correct explanation for A (c) A is True but R is False (d) A is false but R is True	
17	Assertion(A):The resultset refers to a logical set of records that are fetched from the database by executing an SQL query. Reason(R):Resultset stored in a cursor object can be extracted by using fetch(…) functions.	1
18	Assertion(A):Python overwrites an existing file or creates a non-existing file when we open a file with 'w' mode . Reason(R):a+ mode is used only for write operations	1
	SECTION B	
19	Sona has written the following code to check whether number is divisible by 3 .She could not run the code successfully. Rewrite the code and underline each correction done in the code. x=10 for I range in (a) 　If i%3=0: 　　print(I) 　else 　　pass	2
20	Write disadvantage of bus topology and star topology(1 each). 　　　　　**or** What are Routers? How is it differs from gateway?.	2
21	Write output a)a=5 　a+=27 　print(a)	2

	b) a=5 print(a+4<10)	
22	What is scope? What is the scope resolving rule in python?	2
23	(a)Expand the following terms: i)MAN ii)HTML b)What is URL ?	2

24	Write output for the following code.
	
	``python
	def encrypt(str):
	    str1=""
	    for i in str:
	        if i.isupper():
	            str1+=i.lower()
	        else:
	            str1+="*"
	    return str1
	s=encrypt("HeLLo")
	print(s)
	``
	
	or
	
	Go through the python code shown below and find out the possible output(s) from the suggested options i to iv. Also specify maximum and minimum value that can be assigned to the variable j.
	
	``python
	import random
	i=random.random()
	j=random.randint(0,6)
	print(int(i),":",j+int(i))
	``
	(i)0:0 (ii)0:6 (iii)1:7 (iv)1:6
		2

25	Differentiate ORDER BY and GROUP BY with an example. OR Classify the following statements into DDL and DML a)delete b)drop table c)update d)create table	2
SECTION C		

SECTION C

	Consider the following tables CABHUB and CUSTOMER **CABHUB**	
26		3

CABHUB

Vcode	VehicleName	Make	Color	Capacity	Charges
100	Innova	Toyota	WHITE	7	15
102	SX4	Suzuki	BLUE	4	14
104	C Class	Mercedes	RED	4	35
105	A-Star	Suzuki	WHITE	3	14
108	Indigo	Tata	SILVER	3	12

CUSTOMER

CCode	CName	VCode
1	Hemant Sahu	101
2	Raj Lal	108
3	Feroza Shah	105
4	Ketan Dhal	104

a)What will be the output of following statement?

select VehicleName,Capacity from Cabhub c, Customer s where c.Vcode=s.Vcode and c.capacity<4;

b)Write the output of the queries (i) to (iv) based on the table CABHUB
  i)   select count(VCode),Color from CABHUB group by Color;
  ii)   select distinct capacity from Cabhub;
  iii)   select min(Charges),max(charges) from CABHUB;
  iv)   select VehicleName,Make from CABHUB order by VehicleName

---

27

Write a function in python to count number of words ending with 'n' present in a text file "ABC.txt"

If ABC.txt contains "A story of a rich man And his son", the output of the function should be

Count of words ending with 'n' is 2

Or

A text file contains alphanumeric text (say an.txt).Write a program that reads this text file and prints only the numbers or digits from the file.

3

28

a)Write the output of the SQL commands for (i) to (iv) on the basis of tables BOOKS and ISSUES.

Table: BOOKS

Book_ID	BookName	AuthorName	Publisher	Price	Qty
L01	Maths	Raman	ABC	70	20
L02	Science	Agarkar	DEF	90	15
L03	Social	Suresh	XYZ	85	30
L04	Computer	Sumita	ABC	75	7
L05	Telugu	Nannayya	DEF	60	25
L06	English	Wordsworth	DEF	55	12

Table: ISSUES

Book_ID	Qty_Issued
L02	13
L04	5

3
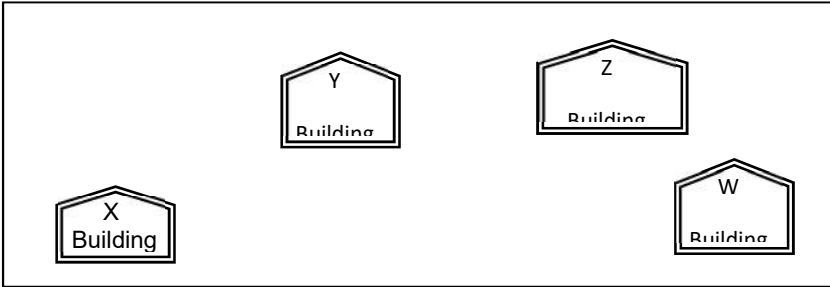
L05	21

(i) select sum(price) as TOTAL_PRICE from BOOKS;
(ii) select * from BOOKS where publisher="DEF";
(iii) select BookName,AuthorName from BOOKS,ISSUES where
BOOKS.Book_ID=ISSUES.Book_ID and Qty_Issued>10;
(iv) select BOOKS.Book_ID,BookName,Publisher,Price,Qty,Qty_Issued from
BOOKS,ISSUES where BOOKS.Book_ID=ISSUES.Book_ID;
b)Write SQL command to display structure of the table BOOKS.

29	Write a function SUMNOS() that accept a list L of numbers and find sum of all even numbers and sum of all odd numbers. If L=[1,2,3,4], Output : sum of even nos:6 Sum of odd numbers:4	3
30	A stack S contains Name of countries.Write a function POP(A), to remove Name from stack. Function should handle underflow condition and should return removed element. **OR** Write a function PUSH(STACK,Name) to add new name to the STACK data structure . Also display all the names having at least 4 characters from the stack.	3

SECTION D

31	"Learn Together" is an educational NGO. It is setting up its new campus at Jabalpur for its web based activities. The campus has 4 compounds as shown in the diagram below: Center to center distances between various buildings is as follows:	5

X Building to Y Building	25 m
Y Building to Z Building	100m
X Building to W Building	110 m
W Building to Y Building	135 m
X Building to Z Building	115 m

Z Building to W Building	35 m

Number of Computers in each of the buildings is follows:

X Building	150
Y Building	15
Z Building	5
W Bulding	20

a)   Suggest the most suitable place (i.e. building) to house the server of this organisation with a suitable reason.

b)   Suggest a cable layout of connections between the buildings.

c)   The organisation is planning to link its admin counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer.

d)   Suggest the placement of the following devices with justification:

    (i)   Repeater
    (ii)   Hub/Switch

e)   In each of the buildings,the management wants that each LAN segment gets a dedicated a bandwidth ie.bandwidth must not be shared. How can this be achieved?

32	a)Write the output of the code given below
	def f():
	   global s
	   s += ' Is Great'
	   print(s)
	   s = "Python is funny"
	s = "Python"
	f()
	print(s)
	b)The code given below inserts the following record in the table Student:
	
	RollNo – integer
	Name – string
	Marks – integer
	Address –String
	Phone-integer
	Note the following to establish connectivity between Python and MYSQL:
		5

- Username is root
- Password is root
- The table exists in a MYSQL database named school.
- The details (RollNo, Name, Marks,Address,Phoneno) are to be accepted from the user.

Write the following missing statements to complete the code:

Statement 1 – to establish connection to the database

Statement 2 – to execute the command that inserts the record in the table Student. Statement 3- to add the record permanently in the database

```
import mysql.connector as con
mycon=con._____(host="localhost",user="root",passwd="root",datab
ase="school")   #statement 1
if mycon.is_connected():
    print("SUCCESSFULLY CONNECTED")
else:
    print("CONNECTION FAILED")
mycursor=mycon.cursor()
r=int(input("Enter roll no "))
s=input("Enter name ")
q=int(input("Enter marks "))
g=input("Enter address ")
l=int(input("Enter phone no "))
query="insert into student values({},'{}',{},'{}',{})"
mycursor._____(query.format(r,s,q,g,l))# statement 2
mycon.____()#statement3
mycon.close()
```

OR

a)Predict the output of the following

```
        def student(firstname, lastname ='Mark', standard ='Fifth'):
            print(firstname, lastname, 'studies in', standard, 'Standard')

        student("John")
        student('George','Jose','Seventh')
```

b) The code given below reads the following record from the table named student and displays only those records whose address is 'Delhi' RollNo – integer Name – string , Marks – integer ,Address-string,Phone-integer

Note the following to establish connectivity between Python and MYSQL:
        Username is root
        Password is root
        The table exists in a MYSQL database named school.

Write the following missing statements to complete the code: Statement 1 – to form the cursor object

Statement 2 – to execute the query that extracts records of those students whose address is 'Delhi'.

	Statement 3- to read the complete result of the query (records who are from "Delhi") into the object named r, from the table student in the database	
| | ```
import mysql.connector as con
mycon=con.connect(host="localhost",user="root",passwd="root",d
atabase="school")
if mycon.is_connected():
    print("SUCCESSFULLY CONNECTED")
else:
    print("CONNECTION FAILED")
mycursor=_____ # statement1
mycursor.execute("_____")#statement2
r=mycursor._____()#statement3
for i in r:
 print(i)
 mycon.close()
``` | |
| 33 | What are the characteristics of csv file ? Write a Program in Python that defines and calls the following user defined functions:

(i) ADD_PROD() – To accept and add information about a product into a csv file named 'product.csv'. Each record consists of prodname and price to store product name and price of the product
(ii) DISPLAY_PROD() – To display details of products having price more than 100 present in the CSV file named 'product.csv'.

OR

When do we use csv file?. Write a Program in Python that defines and calls the following user defined functions:

(i) insert_ROLL()– To accept and add data of a student to a CSV file 'marks.csv'. Each record consists of a list with field elements as rollno, mark to store roll number and mark of students respectively.
(ii) read_ROLL()- To display and count the records of the students. | 5 |
| | **SECTION E** | |
| 34 | Advaith,a manager has stored the details of departments in a table called DEPARTMENT.<br><br>```
DEPTNO   DNAME          LOC
-----    --------------    --------
  10    ACCOUNTING   NEW YORK
  20    RESEARCH       DALLAS
  30    SALES            CHICAGO
  40    OPERATIONS   BOSTON
``` | 1+1+2 |

He wants to add one more record to this table and has written the following code and unable to insert that record.
INSERT INTO DEPARTMENT VALUES(43,"HRD");

i. Help him to correct the code for adding the record
ii. How can he restrict Null values in the table
iii. Write a commands to :
a. show the names of department starting with "R".
b.update LOC as "New York" for DEPTNO 30.

OR(Option for part iii only)

iii.Write a commands to :
a.insert the following record into the table:DEPTNO-47,DNAME-Accounting,LOC-Paris
b.delete the records of location(LOC) "Boston"

Manju has created a program using two functions for storing his friends' exam roll numbers and marks in a binary file "STUDENT.DAT" and to display total mark.But he forgot some lines of code. As a programmer, help him to complete the task and to run the program successfully.

```
_____                          #Line 1
def create_File():
    f=open("STUDENT.DAT","ab")
    rollno=int(input("Enter roll number"))
    m1=int(input("Enter Mark1"))
    m2=int(input("Enter Mark2"))
    m3=int(input("Enter Mark3"))
    d={"rollno":rollno,"M1":m1,"M2":m2,"M3":m3}
    pickle._____(d,f)                        #Line2
    f.close()
s={}
def read_File():
   with open("STUDENT.DAT","rb") as f:
     try:
       while True:
         s=_____                  #Line3
         t=s["M1"]+s["M2"]+s["M3"]
         print("RollNo:",s[rollno],"Total Mark:",t)
     except:
       _____                   #Line 4
```

a)Fill in the blank in Line 1 to import required module.
b)Fill in the blank in Line 2 to write the record
c)Complete Line 3 for reading the record
d)Write the code in the line marked Line4

35   4

Q.NO	PART A	Marks
	Section -A	
1	d)=	1
2	a)bool	1
3	d)class	1
4	d)both b and c	1
5	d)pickle	1
6	b)[]	1
7	b)5 10	1
8	c)Many	1
9	a)read	1
10	c)list	1
11	c)IN	1
12	c)UPPER()	1
13	DISTINCT	1
14	b)hub	1
15	a)3	1
16	c)star topology	1
17	b	1
18	c	1
	Section-B	

19	x=10
	for I in range(a):
	  if I%3==0:
	    print(I)
	   else:
	    pass
		2

20	Disadvantages of bus topology 1.Identification of problems becomes difficult if the whole network goes down 2. Need terminators are required at both ends of the main cable Disadvantages of star topology 1.If hub goes down everything goes down, none of the devices can work without hub. 2.More expensive than linear bus topology due to the value of the connecting devices (network switches) **or** What are routers?. A router is **a network device that can receive the data , analyse it and transmit it to other networks** . It is used to connect a Local Area Network to	2

	the internet. Using a routing table, it ensures that data packets are travelling through the best suitable paths to their destinations. In simple words, a gateway is a device that we use for communicating among various networks possessing different protocol sets. It is responsible for converting a given protocol to another one.Gateway connects dissimilar network	
21	a)32 b) True	1+1
22	What is scope? What is the scope resolving rule in python? The **scope** of a **variable** is the region of a program in which the **variable** is visible, i.e., in which it is accessible by its name and can be used. **Scope resolution** is required when a variable is used to determine where should its value be come from. **Scope resolution** in **Python** follows the LEGB **rule.**	2
23	a)MAN –Metropolitan Area Network b)HTML –Hyper Text Mark up Language **URL** stands for *Uniform Resource Locator*. A URL is nothing more than the address of a given unique resource on the Web.	1+1
24	h*ll* OR minimum-0 maximum -1 options(i) and (ii)	2
25	**1. Order By :** Order by keyword sort the result-set either in ascending or in descending order. This clause sorts the result-set in ascending order by default. In order to sort the result-set in descending order **DESC** keyword is used. **Order By Syntax –** SELECT column_1, column_2, column_3........... FROM Table_Name ORDER BY column_1, column_2, column_3....... ASC|DESC; **2. Group By :** Group by statement is used to group the rows that have the same value. It is often used with aggregate functions for example:AVG(), MAX(), COUNT(), MIN() etc. One thing to remember about the group by clause is that the tuples are grouped based on the similarity between the attribute values of tuples. **Group By Syntax –** SELECT function_Name(column_1), column_2 FROM Table_Name	2

WHERE condition
GROUP BY column_1, column_2
ORDER BY column_1, column_2;
OR
a)delete -DML b)drop table -DDL c)update -DML d)create table-DDL

26 1+2

a)

Vehicle	Capacity
A-Star	3
Indigo	3

b)

I)

count(vcode)	color
2	WHITE
1	BLUE
1	RED
1	SILVER

II)

distinct capacity
7
4
3

III)

min(charge)	max(charge)
12	35

iv)

Vehicle Name	Make
A-Star	Suzuki
C Class	Mercedes
Indigo	Tata
Innova	Toyota
SX4	Suzuki

27 3

```
def countA():
    file=open("ABC.txt",'r')
    r=file.read()
    s=r.split()
    count=0
    for i in s:
        if i[-1]=='n':
            count+=1
    file.close()
    print("Count of words ending with "n" is", count)
```

	OR
	def printnum():
	  file=open("an.txt",'r')
	  r=file.read()
	  for i in r:
	    if i.isdigt():
	     print(i)
	  file.close()	

28	a)i) TOTAL_PRICE 435 ii)	2+1

a)i)

TOTAL_PRICE
435

ii)

Book_ID	BookName	AuthorName	Publisher	Price	Qty
L02	Science	Agarkar	DEF	90	15
L05	Telugu	Nannayya	DEF	60	25
L06	English	Wordsworth	DEF	55	12

iii)

BookName	AuthorName
Science	Agarkar
Telugu	Nannayya

iv)

Book_ID	BookName	Publisher	Price	Qty	Qty_Issued
L02	Science	DEF	90	15	13
L04	Computer	ABC	75	7	5
L05	Telugu	DEF	60	25	21

b)DESC BOOKS

| 29 | def SUMNOS(L):
  SE=0
  SO=0
  for i in L:
    if i%2==0:
      SE+=i
    else:
       SO+=i
  print("Sum of Even no:s=",SE)
      print("Sum of Odd no:s=",SO) | 3 |
| 30 | def POP(A):
  if len(A)==0:
    print("UNDERFLOW")
  else: | 3 |

```
        val=A.pop()
     return val


OR
Write a function PUSH(STACK,Name) to add new name to the STACK data
structure . Also display all the names having atleast 4 characters from the
stack.
def PUSH(STACK,Name):
        STACK.append(Name)
#code for displaying
        if len(STACK)==0:
                print("Empty stack")
        else:
                top=len(STACK)-1
                for i in range(top,-1,-1):
                    if len(STACK[i])>=4:
                    print(STACK[i] )
```

| 31 | a) The most suitable place / block to house the server of this organisation would be X Building, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

b)
Answer:
Layout 1

Layout 2:

 c)
         Answer:
The type of network that shall be formed to link the sale counters situated in various parts of the same city would be a MAN, because MAN (Metropolitan Area Networks) are the networks that link computer facilities within a city.
d) | 5(1 each) |

	Answer: (i) In layout1 between X&Z,X&W.In layout2 between Y and Z.Because distance is more than 90m. (ii) In both the layouts, a hub/switch each would be needed in all the buildings, to interconnect the group of cables from the different computers in each block e)switch	

32	a)Python Is Great
	   Python is funny
	b)statement 1-connect
	  statement2-execute
	  statement3-commit
	OR
	a)John Mark studies in Fifth Standard
	  George Jose studies in Seventh Standard
	b)Statement1-mycon.cursor()
	statement2-select * from student where address="Delhi"
	statement3-fetchall()
		2+3

33	- One line for each record - Comma separated fields - Space-characters adjacent to commas are ignored - Fields with in-built commas are separated by double quote characters. import csv
	  def ADD_PROD():
	    fout=open("product.csv","a",newline="\n")
	   wr=csv.writer(fout)
	   prodname=input("Enter Product name :: ")
	   price=float(input("Enter Price:: "))
	   lst=[prodname,price]
	   wr.writerow(lst)
	   fout.close()
	
	  def DISPLAY_PROD():
	   found=False
	   fin=open("record.csv","r",newline="\n")
	   data=csv.reader(fin)
	   for i in data:
	    if int(i[1])>100:
	     found=True
	     print(i[0],i[1])
	    if found==False:
		5

```
                    print("Record not found")
                fin.close()
ADD_PROD()
print("Displaying product having price more than 100\n")
DISPLAY_PROD()

OR
 CSV file are useful when we need to  import data into many other software
applications.

            import csv
                def inser_ROLL():
                    fout=open("marks.csv","a",newline="\n")
                wr=csv.writer(fout)
                rollno=int(input("Enter Roll number "))
                mark=float(input("Enter mark :: "))
                lst=[rollno,mark]
                wr.writerow(lst)
                fout.close()

            def read_ROLL():
                fin=open("marks.csv","r",newline="\n")
                data=csv.reader(fin)
                 d=list(data)
                 print("No.of records=":,len(d))
                 for i in data:
                        print(i)
                fin.close()
```

34	iv. INSERT INTO DEPARTMENT(deptno,dname) VALUES(43,"HRD");
	 v. by adding constraint NOT NULL
	 vi. a. select DName from DEPARTMENT where Dname like "R%";
	        b.update DEPARTMENT set LOC="NEW YORK" where DEPTNO=30;
	        OR
	 iii. a. insert into DEPARTMENT values(47,"Accounting","Paris");
	        b.delete from DEPARTMENT where LOC="Boston";
		1+1+2

35	a)Fill in the blank in Line 1 to import required module. a)import pickle b)Fill in the blank in Line 2 b)dump c)Complete line3 c)pickle.load(f) d)Write the code in Line4 f.close()	1+1+1+1

KENDRIYA VIDYALAYA SANGHATHAN – ERNAKULAM REGION

	SAMPLE PAPER (UNSOLVED) – COMPUTER SCIENCE (083)	
	MAX MARKS: 70 **TOTAL TIME : 3 hrs**	
	Part A	
	Section 1 [18 marks] (1x18)	
1	Which of the following is an invalid identifier? a. CS_class_XII b. csclass12 c. _csclass12 d. 12CS	1
2	Which of the is a correct statement? a. xyz = 10 100 1000 b. x y z = 10 100 1000 c. x, y, z = 10, 100, 1000 d. x y z= 10, 100, 1000	1
3	Aman wants to write a function in python. But he doesn't know how to start with it! Select the keyword used to start a function out of the following: a) function b) start c) def d) fun	1
4	Which of the following is not a part of the python function? a) function header b) return statement c) parameter list d) function keyword	1
5	Which of the following is the correct statement for checking the presence of a key in the dictionary? a) <key> in <dictionary_object> a) <key> not in <dictionary_object> c) <key> found in <dictionary_object> d) a) <key> exists in <dictionary_object>	1

6	What will be the output of :
	  t=(4,5,6)
	 del t[1]
	   print(t)
	
	a) (4,6) b) ([4,6])
	c) [4,6] d) Error
		1

7	Which of the following statement is correct? a) Tuples are mutable. b) Tuples are immutable. c) Tuples and lists are same. d) All of these are correct.	1
8	What will be the output of following code: txt="Term 1"	1

	print(txt*2) a) Term 1 Term 2 b) Term 1Term 1 c) Term 1 2 d) TTeerrmm 11	
9	The append() method adds an element at a. first b. last c. specified index d. at any location	1
10	Which point can be considered as difference between string and list? a. Length b. Indexing and Slicing c. Mutability d. Accessing individual elements	1
11	If n="Hello" and user wants to assign n[0]='F' what will be the result? a. It will replace the first character b.It's not allowed in Python to assign a value to an individual character using index c.It will replace the entire word Hello into F d.It will remove H and keep rest of the characters	1
12	In list slicing, the start and stop can be given beyond limits. If it is then a. raise exception IndexError b. raise exception ValueError c. return elements falling between specified start and stop values d. return the entire list	1
13	Ms. Hetvee is working on a string program. She wants to display last four characters of a string object named s. Which of the following is statement is true? a. s[4:] b. s[:4] c. s[-4:] d. s[:-4]	1
14	Which of the following statement is true for extend() list method? a. adds element at last b. adds multiple elements at last c. adds element at specified index d. adds elements at random index	1
15	The statement del l[1:3] do which of the following task? a. deletes elements 2 to 4 elements from the list b. deletes 2nd and 3rd element from the list c. deletes 1st and 3rd element from the list d. deletes 1st, 2nd and 3rd element from the list	1
16	If l=[11,22,33,44], then output of print(len(l)) will be a. 4 b. 3	1

	c. 8 d. 6	
17	Assertion(A) The personal area Network (PAN) is established within a very small area(20 to 30 sq ft) to share the information. Reason (R): The campus are network is used to interconnect the computers located within a campus such as university campus, corporate campus, hospital campus etc. Based on the above discussion, choose an appropriate state form the options given below: (a) Both assertion and reason are true and the reason is the correct explanation of assertion. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion. (c) Assertion is true but reason is false. (d) Assertion is false but reason is true. (e) Assertion and reason both are wrong.	1
18	Assertion (A) : In SQL, the aggregate function Avg() calculates the average value on a set of values and produce a single result. Reason (R) : The aggregate functions are used to perform some fundamental arithmetic tasks such as Min(),Max(), Sum() etc (a) Both assertion and reason are true and the reason is the correct explanation of assertion. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion. (c) Assertion is true but reason is false. (d) Assertion is false but reason is true. (e) Assertion and reason both are wrong.	1
	Section B **[14 marks]** **[2x7=14]**	
19	Evaluate the following expressions: a) 7*3+4**2//5-8 b) 7>5 and 8>20 or not 12>4	2
20	Write down the fullform of : A. FTP b) HTML c) SMTP d) VoIP	2
21	What are actual and formal parameters in Functions? Differentiate using example.	2
22	Write the queries for the following questions using the table Product with the following fields. (P_ Code, P_Name, Qty, Price) (i) Display the price of product having code as P06. (ii) Display the name of all products with quantity greater than 50 and price less than 500	2
23	Give two characteristics of Stacks	2
24	In the table Loan below (a) Identify the candidate key(s) from the table Loan.	2

	(b) Which field will be considered as the foreign key if the tables Customers and Loan are related in a database?	
	Table Loan	

LoanID	LoanDate	ID	EMI	Years
1101	2021-03-01	5	20000	4
1102	2021-02-06	3	10000	2
1103	2021-04-12	4	10000	3
1104	2021-05-15	5	5000	3

Table Customers:

ID	Name	Age	City	Salary
1	Kashika	37	Jammu	80000.00
2	Anupriya	35	Shimla	75000.00
3	Vijayan	36	Hyderabad	65000.00
4	Krishnan	35	Chennai	55000.00
5	Harsh	37	Gandhinagar	85000.00
6	Raisa	32	Mumbai	45000.00

25	Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code.
	
	Value=30
	for VAL in range(0,Value)
	If val%4==0:
	      print (VAL*4)
	 Elseif val%5==0:
	       print (VAL+3)
	else
	 print(VAL+10)
		2

Section C [15 Marks] [3x5]
Answer All questions

26	Coach Abhishek stores the races and participants in a dictionary. Write a program, with separate user defined functions to perform the following operations: a. Push() Push the names of the participants of the dictionary onto a stack, where the distance is more than 100. b. PoP() Pop and display the content of the stack. For example: If the sample content of the dictionary is as follows: Races ={100:'Varnika', 200 :'Jugal', 400:'Kushal', 800:'Minisha'}} The output from the program should be: Minisha Kushal Jugal	3

27	a) Write the outputs of the SQL queries (i) to (iv) based on the relations Teacher and Placement given below: Table : Teacher	3

Table : Teacher

T_ID	Name	Age	Department	Date_of_join	Salary	Gender
1	Arunan	34	Computer Sc	2019-01-10	12000	M
2	Saman	31	History	2017-03-24	20000	F
3	Randeep	32	Mathematics	2020-12-12	30000	M
4	Samira	35	History	2018-07-01	40000	F
5	Raman	42	Mathematics	2021-09-05	25000	M
6	Shyam	50	History	2019-06-27	30000	M
7	Shiv	44	Computer Sc	2019-02-25	21000	M
8	Shalakha	33	Mathematics	2018-07-31	20000	F

Table : Placement

P_ID	Department	Place
1	History	Ahmedabad
2	Mathematics	Jaipur
3	Computer Sc	Nagpur

(i) SELECT Department, sum(Salary) FROM Teacher WHERE Salary>12000 GROUP BY Department;

ii) SELECT MAX(Date_of_Join),MIN(Date_of_Join) FROM Teacher WHERE Gender='M';

iii) SELECT Name, Salary, T.Department, Place FROM Teacher T, Placement P WHERE T.Department = P.Department AND T.Department Like '%o%;

iv) SELECT Name, Place FROM Teacher T, Placement P WHERE Gender ='M' AND T.Department=P.Department;

(b) Write the command to remove all the tuples of a table

28	Write a program to count a total number of lines and count the total number of lines starting with 'A', 'B', and 'C'. (Consider the merge.txt file) Or Write a method/function DISPLAYWORDS() in python to read lines from a text file STORY.TXT, and display those words, which are less than 4 characters.	3
29	You are a student in CBSE school. 1 Teacher has given a task to write a python code to perform the following binary file operations with the help of two user defined functions/modules:	3

	a)　　Addrecord() to create a binary file called school.dat containing student information (in list datatype) - student number, name, marks(out of 100) of each student. Or b)　　Search() to display name and marks of the student by asking the student number from the user.	
30	Give the output of the following Queries from the given table: Given the following Employee Form : | No	Name	Age	Department	Dateofrt d	Salary	Sex
---	---	---	---	---	---	---
1	Pankaj	54	Engg.	10/01/97	1200	M
2	Shalini	41	Estbl	24/03/98	2000	F
3	Sanjay	32	Engg.	12/12/96	3500	M
4	Sudha	25	Science	01/07/99	4700	F
5	Rakesh	32	Engg.	05/09/97	2500	M
6	Shakeel	40	Language	27/06/98	3000	M
7	Surya	44	Estbl.	25/02/97	2100	M
8	Shikha	33	Science	31/07/97	2600	F | a)　　SELECT COUNT(age) FROM employee WHERE age>33; b)　　Select COUT(distinct department) from EMPLOYEE; c)　　 Select MAX(Age) from EMPLOYEE where SEX ="F";	3
	Section D　　[15 Marks] **[5x3]**	
31	China Middleton Fashion is planning to expand their network in India, starting with two cities to provide infrastructure for distribution of their products. The company has planned to setup their main office in Chennai at three different locations and have named their offices as Production Unit, Finance Unit and Media Unit. The company's rough layout of the same is as follows: its Corporate Unit in Delhi. A rough layout of the same is as follows: 	5

Approximate distance between these units is as follows:

From	To	Distance
Production Unit	Finance Unit	70 m
Production Unit	Media Unit	15 m
Production Unit	Corporate Unit	2112 m
Finance Unit	Media Unit	15 m

In continuation of the above, the company experts have planned to install the following number of computers in each of these units.

To	Computers
Production Unit	150
Finance Unit	35
Media Unit	10
Corporate Unit	30

(i) Suggest the kind of network required (out of LAN, MAN, WAN) for each of the following units. (2)

(a) Production Unit and Media Unit

(b) Production Unit and Finance Unit

(ii) Which of the following devices will you suggest for connecting all computers with each of their office units? (1)

(a) Switch/Hub   (b) Modem   (c) Telephone

(iii) Suggest a cable/wiring layout for connecting the company's local office units located in Chennai. Also, suggest an effective method/technology for connecting the company's office unit located in Delhi (2)

32

A. Find an output of the following code

```
def func(b):
    global x
print('Global x=', x)
y = x + b
 x = 7
z = x – b
print('Local x = ',x)
print('y = ',y)
print('z = ',z)
x=3
func(5)
```

B.) ABC Infotech Pvt. Ltd. needs to store, retrieve and delete the records of its employees. Develop an interface that provides front-end interaction through Python, and stores and updates records using MySQL.

The operations on MySQL table "emp" involve reading, searching, updating and deleting the records of employees.

5

(2+3)

Give statements for 1,2 , 3or4

```
import _____ #statement1
db1 = mysql.connector.connect (host = "localhost", user = "root", password =
"pathwalla", database = "company")
cursor = db1.cursor()

sql = "SELECT FROM EMP WHERE SALARY> 70000;"

try:
    cursor._____(sql) #statement2

    resultset = cursor_____ () #statement3
    for _____ in resultset:   #statement4
        empno = row [0]
        ename = row [1]
        salary = row [2]
    print (("empno-3d, ename=%s, salary-8f") % (empno, ename, salary))
except:
print ("Error: unable to fetch data")
 db1close()
```

33	What is the advantage of using a csv file for permanent storage?' Write a Program in Python that defines and calls the following user defined functions: (i) ADD() – To accept and add data of a student to a CSV file 'Stud.csv'. Each record consists of a list with field elements as studid,s name and Smark to store student id, student name and student percent marks respectively. (ii) Count() – To count the number of records present in the CSV file where Smark is greater then 75% from stud.csv. <center>**OR**</center>Give any one point of difference between a binary file and a csv file. Write a Program in Python that defines and calls the following user defined functions: (i) add() – To accept and add data of a client to a CSV file 'Client.csv'. Each record consists of a list with field elements as Cid, Cname and CCity (ii) search()- To display the records of the Clients whose city is KOCHI	5

<center>**SECTION E (4x2= 8 marks)**</center>

34	Consider the table 'PERSONS' given below	4

Pid	Surname	FirstName	Gender	City	PinCode	BasicSalary
1	Sharma	Geeta	F	Udhamwara	182141	50000
2	Singh	Surinder	M	Kupwara Nagar	193222	75000
3	Jacob	Peter	M	Bhawani	185155	45000
4	Alvis	Thomas	M	Ahmed Nagar	380025	50000
5	Mohan	Garima	M	Nagar Coolangatta	390026	33000
6	Azmi	Simi	F	New Delhi	110021	40000
7	Kaur	Manpreet	F	Udhamwara	182141	42000

	(i) Display the SurNames, FirstNames and Cities of people residing in Udhamwara city. (ii) Display the Person Ids (PID), cities and Pincodes of persons in descending order of Pincodes. (iii) Display the First Names and cities of all the females getting Basic salaries above 40000. (iv) Display First Names and Basic Salaries of all the persons whose firstnames starts with "G"	

35	Consider an employee data, Empcode, empname and salary. Sneha Wrote python function to create binary file emp.dat and store their records. And function to read and display all the records Help her complete the code
	import_____ #STATEMENT 1
	def add_record():
	    f = open("emp.dat","ab")
	    empcode =int(input("employee code:"))
	    empname = int(input("empName:"))
	    salary = int(input("salary:"))
	    d = [empcode, empname, salary]
	    pickle.dump(_____) #STATEMENT 2
	    f. close()
	
	def search():
	  f=open("_____","rb") #STATEMENT 3
	  while True:
	    try:
	      d=pickle.load(___) #STATEMENT 4
	      print(d)
	    except EOFError:
	     break
	f.close()
		4

CBSE 2021 - TERM-1 QUESTION PAPER COMPUTER SCIENCE (083)

SECTION – A

This section consists of **25** Questions (1 to 25). Attempt any **20** questions from this section. Choose the best possible option.

1. Find the invalid identifier from the following
   (a) `name`   (b) `class`
   (c) `section`   (d) `break`

2. Which of the following is a function/method of the pickle module ?
   (a) `reader( )`   (b) `writer( )`
   (c) `load( )`   (d) `read( )`

3. For a given declaration in Python as s= `"WELCOME"`
   Which of the following will be the correct output of print (S [1: :2]) ?
   (a) `WEL`   (b) `COME`
   (c) `WLOE`   (d) `ECM`

4. Which of the following statement is not correct ?
   (a) We can write content into a text file opened using 'w' mode
   (b) We can write content into a text file opened using 'w+' mode
   (c) We can write content into a text file opened using 'r' mode
   (d) We can write content into a text file opened using 'r+' mode

5. Which of the following option is the correct Python statement to read and display the first 10 characters of a text file "Notes. txt" ?
   (a) `F = open ('Notes.txt'); print(F.load(10))`
   (b) `F = open ('Notes.txt'); print(F.dump(10))`
   (c) `F = open ('Notes.txt'); print(F.read(10))`
   (d) `F = open ('Notes.txt'); print(F.write(10))`

6. Which of the following is not a correct Python statement to open a text file "Notes. txt" to write content into it ?
   (a) `F = open ('Notes.txt', 'w')`
   (b) `F = open ('Notes.txt', 'a')`
   (c) `F = open ('Notes.txt', 'A')`
   (d) `F = open ('Notes.txt', 'w+')`

7. A text file opened using the following statement :

`MyFile = open('Notes.txt')`

Which of the following is the correct Python statement to close it ?

(a) `MyFile=close('Notes.txt')`

(b) `MyFile.close('Notes.txt')`

(c) `close.MyFile()`

(d) `MyFile.close()`

8. Which of the following option is the correct usage for the tell( ) of a file object ?

(a) It places the file pointer at a desired offset in a file

(b) It returns the entire content of a file

(c) It returns the byte position of the file pointer as an integer

(d) It tells the details about the file

9. Which of the following is an incorrect Logical operator in Python ?

(a) `not`   (b) `in`

(c) `or`   (d) `and`

10. Given the Python declaration `S1 = "Hello"`. Which of the following statements will give an error ?

(a) `print(S1[4])`   (b) `S2=S1`

(c) `S1=S1[4]`   (d) `S1[4]="Y"`

11. Which of the following statement is **incorrect** in the context of pickled binary files ?

(a) `csv` module is used for reading and writing objects in binary files.

(b) `pickle` module is used for reading and writing objects in binary files.

(c) `load()` of the pickle module is used to read objects

(d) `dump()` of the pickle module is used to write objects

12. What is the significance of the seek( ) method ?

(a) It seeks the absolute path of the file.

(b) It tells the current byte position of the file pointer within the file.

(c) It places the file pointer at a desired offset within the file.

(d) It seeks the entire content of the file.

13. Which of the following is the correct expansion of csv ?
    (a) Comma Separated Values.   (b) Centrally Secured Values.
    (c) Computerised Secured Values. (d) Comma Secured Values.

14. If the following statement is used to read the contents of a textfile object F:
    `X=F.readlines()`
    Which of the following is the correct data type of x ?
    (a) string   (b) list
    (c) tuple   (d) dictionary

15. Which of the following is **not** correct in context of Positional and Default parameters in Python functions ?
    (a) Default parameters must occur to the right of Positional parameters
    (b) Positional parameters must occur to the right of Default parameters
    (c) Positional parameters must occur to the left of Default parameters
    (d) All parameters to the right of a Default parameter must also have Default values.

16. For a function header as follows :
    `def Calc(X, Y=20) :`
    Which of the following function calls will give an Error ?
    (a) `Calc(15,25)`   (b) `Calc(X=15,Y=25)`
    (c) `Calc(Y=25)`   (d) `Calc(X=25)`

17. Which of the following is not correct in context of scope of variables ?
    (a) global keyword is used to change value of a global variable in a local scope
    (b) local keyword is used to change value of a local variable in a global scope
    (c) global variables can be accessed without using the global keyword in a local scope
    (d) local variables cannot be used outside its scope

18. Which of the following is the default character for the newline parameter for a csv file object opened in write mode in Python IDLE ?
    (a) `\n`   (b) `\t`
    (c) `,`   (d) `;`

19. Which of the following is the correct output for the execution of the following Python statement ?

    ```
    print(5 + 3 ** 2 /2)
    ```

    (a) 32   (b) 8.0
    (c) 9.5   (d) 32.0

20. Which of the following is not a Tuple in Python ?

    (a) `(1,2,3)`   (b) `("One", "Two", "Three")`
    (c) `(10 ,)`   (d) `("One")`

21. Which of the following is not a function/method of the random module in Python

    (a) `randfloat()`   (b) `randint()`
    (c) `random()`   (d) `randrange()`

22. Which of the following is not a valid Python string operation ?

    (a) `'Welcome' + '10'`   (b) `'Welcome' * 10`
    (c) `'Welcome' * 10.0`   (d) `"10" + 'Welcome'`

23. What will be the output for the following Python statements ?

    ```
    T=(10,20,[30,40,50],60,70)
    T[2][1]= 100
    print(T)
    ```

    (a) (10, 20, 100, 60, 70)
    (b) (10, 20, [30,100,50], 60, 70)
    (c) (10, 20, [100,40,50], 60, 70)
    (d) Error

24. What will be the output for the following Python statements ?

    ```
    L =[10, 20, 30, 40, 50]
    L = L + 5
    print(L)
    ```

    (a) [10, 20, 30, 40, 50, 5]   (b) [15, 25, 35, 45, 55]
    (c) [5, 10, 20, 30, 40, 50]   (d) Error

25. What will be the output for the following Python statements ?

```
D= {"AMIT":90, "RESHMA":96, "SUKHBIR":92, "JOHN":95}
print("JOHN" in D, 90 in D, sep = "#")
```

   (a) Truef#False

   (b) True#True

   (c) False#True

   (d) False#False

SECTION – B

This section consists of 24 Questions (26 to 49). Attempt any 20 questions.

26. Nitish has declared a tuple T in Python as following :

```
T = (10, 20, 30)
```

   Now, he wants to insert an element 40 after these three elements of T so that the tuple may contain (10, 20, 30, 40).

   Which of the following statements shall Nitish write to accomplish the above task ?

   (a) T = T + 40

   (b) T = T + (40)

   (c) T = T + (40,)

   (d) Nitish cannot insert 40 into the tuple since Tuples are immutable

27. Suppose the content of a text file Notes.txt is :

   "The way to get started is to quit talking and begin doing"

   What will be the output of the following Python code ?

```
F = open("Notes.txt")
F.seek(29)
S = F.read()
print(S)
```

   (a) The way to get started is to

   (b) quit talking and begin doing

   (c) The way to get started is to quit talking and begin doing

   (d) gniod nigeb dna gniklat tiuq ot si detrats teg ot yaw ehT

28. Identify the output of the following Python statements

```
S = "GOOD MORNING"
print(S.capitalize(),S.title(),end="!")
```

   (a) GOOD MORNING!Good morning

   (b) Good Morning!Good morning

   (c) Good morning!Good Morning!

   (d) Good morning Good Morning!

29. Identify the output of the following Python statements
```
L = []
for i in range (4):
L.append(2*i+1)
print(L[::-1])
```
(a) [7,5,3,1]   (b) [9,7,5,3]
(c) [4,3,2,1]   (d) [1,2,3,4]

30. Identify the output of the following Python statements :
```
D={}
T=("ZEESHAN","NISHANT","GURMEET","LISA")
for i in range(1, 5):
    D[i]=T[i-1]
print(D)
```
(a) {"ZEESHAN","NISHANT","GURMEET","LISA"}

(b) "ZEESHAN","NISHANT","GURMEET","LISA"

(c) {[1,"ZEESHAN"],[2,"NISHANT"],[3,"GURMEET"],[4,"LISA"]}

(d) {1:"ZEESHAN",2:"NISHANT",3:"GURMEET",4:"LISA"}

31. Identify the output of the following Python statements
```
L1, L2 = [10, 15, 20, 25], []
for i in range(len(L1)) :
    L2. insert( i,L1.pop())
print (LI, L2,sep="&")
```
(a) []&[25, 20, 15, 10]
(b) [10, 15, 20, 25]&[25, 20, 15, 10]
(c) [10, 15, 20, 25]&[10, 15, 20, 25]
(d) [25, 20, 15, 10]&[]

32. Which of the following Python modules is imported to store and retrieve objects using the process of serialization and deserialization ?
(a) csv   (b) binary
(c) math   (d) pickle

33. Which of the following function is used with the csv module in Python to read the contents of a csv file into an object ?
(a) readrow( )   (b) readrows( )
(c) reader( )   (d) load( )

34. What will be the output of the following Python code ?

```python
S="WELCOME"
def Change(T) :
    T="HELLO"
    print(T, end='@')
Change(S)
print(S)
```

(a) WELCOME@HELLO   (b) HELLO@HELLO

(c) HELLO@WELCOME   (d) WELCOME@WELCOME

35. Identify the correct possible output for the following Python code :

```python
import random
for N in range(2,5,2) :
    print(random.randrange(1,N),end="#")
```

(a) 1#3#5#   (b) 2#3#

(c) 1#4#   (d) 1#3#

36. What will be the output of the following Python code ?

```python
def FunStr(S) :
    T = ""
    for i in S:
        if i.isdigit() :
            T = T + i
    return T
X = "PYTHON 3.9"
Y = FunStr(X)
print(X, Y, sep="*")
```

(a) PYTHON 3.9   (b) PYTHON 3.9*3.9

(c) PYTHON 3.9*39   (d) Error

37. What will be the output of the following Python code ?

```python
v = 50
def Change(N) :
    global V
    V, N = N, V
    print(V, N, sep="#",end="@")
Change(20)
print(V)
```

(a) 20#50@20   (b) 50@20#50

(c) 50#50#50   (d) 20@50#20

38. Which of the following option can be the output for the following Python code ?
```
Ll = [10,20,30,20,10]
L2 = []
for i  in Ll:
    if i not in L2:
        L2.append(i)
print(Ll, L2,sep="&")
```
(a) `[10,20,30,20,10]&[10,20,30,20,10]`

(b) `[10,20,30,20,10][10,20,30,20,10]&`

(c) `[10,20,30,20,10]&[30,20,10]`

(d) `[10,20,30,20,10]&[10,20,30]`

39. What is the output of the following Python code ?
```
def ListChange():
    for i in range(len(L)):
        if L[i]%2 == 0:
            L[i]=L[i]*2
        if L[i]%3  == 0:
            L[i]=L[i]*3
        else   :
            L[i]=L[i]*5
L = [2,6,9,10]
ListChange()
for i in L:
    print(i,end="#")
```
(a) `4#12#27#20#`   (b) `6#18#27#50#`

(c) `20#36#27#100#`   (d) `Error`

40. Suppose the content of a text file "Rhymes.txt" is as follows :
```
Jack & Jill
went up  the hill
```
What will be the output of the following Python code ?
```
F = open("Rhymes.txt")
L = F.readlines()
for i in L:
    S=i.split()
    print(len(S),end="#")
```
(a) `2#4#`   (b) `3#4#`

(c) `2#`   (d) `7#`

41. Identify the output of the following Python code :

```
D={1:"One", 2:"Two", 3: "Three"}
L=[]
for K,V in D.items():
    if V[0]=="T":
        L.append(K)
print(L)
```

(a) [1,2,3] (b) ["One", "Two", "Three"]

(c) [2,3] (d) ["Two", "Three"]

42. Suppose the content of "Rhymes.txt" is :

Baa baa black   sheep,

have you   any wool?

What will be the output of the following Python code ?

```
F = open("Rhymes.txt")
S = F.read()
L=S.split ()
for i in L :
    if len(i) %3 != 0 :
        print(i, end= " ")
```

(a) Baa baa you any (b) black have wool?

(c) black sheep, have wool? (d) Error

43. Suppose the content of "Rhymes.txt" is

One, two, three, four, five

Once I caught a fish alive.

What will be the output of the following Python code ?

```
F = open("Rhymes.txt")
S = F.read()
print(S.count('e',20))
```

(a) 20 (b) 1

(c) 3 (d) 6

44. What will be the output of the following Python code ?

```
V = 25
def Fun(Ch):
    V=50
    print(V, end=Ch)
    V *= 2
    print(V, end=Ch)
print(V, end="*")
Fun("!")
print(V)
```

(a) 25*50!100!25

(b) 50*100!100!100

(c) 25*50!100!100

(d) Error

45. Suppose the content of "Rhymes.txt" is

Good Morning Madam

What will be the output of the following Python code ?

```
F = open("Rhymes.txt")
L = F.read().split ()
for W in L:
    if W.lower()== W[::-1].lower():
        print(W)
```

(a) Good

(b) Morning

(c) Madam

(d) Error

46. Suppose the content of "Rhymes.txt" is

Hickory Dickory Dock

The mouse went up the clock

What will be the output of the following Python code ?

```
F = open("Rhymes.txt")
L = F.readlines()
X = ["the", "ock"]
for i in L:
    for W in i.split() :
if W in X:
    print(W,end = "*")
```

(a) the*

(b) Dock*The*the*clock*

(c) Dock*the*clock*

(d) Error

47. Consider the following directory structure.
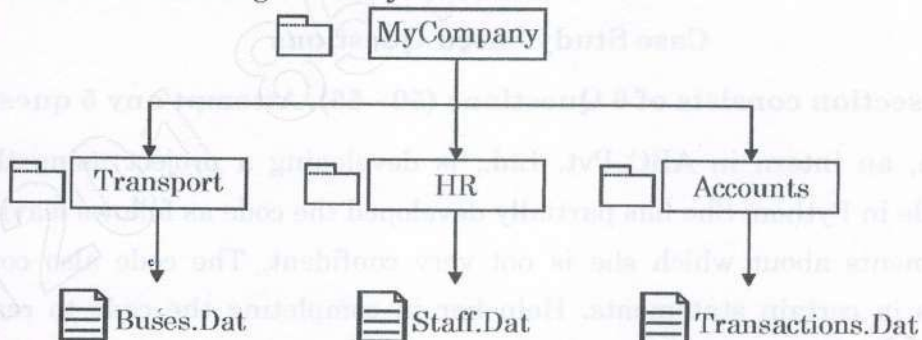
Suppose the present working directory is MyCompany. What will be the relative path of the file Transactions. Dat?

(a) `MyCompany/Transactions.Dat`

(b) `MyCompany/Accounts/Transactions.Dat`

(c) `Accounts/Transactions.Dat`

(d) `../Transactions.Dat`

48. What will be the output of the following Python code ?
```
S="UVW";L=[10,20,30];D={}
N=len(S)
for I in range(N):
    D[L[I]] = S[I]
for K,V in D.items():
    print (K,V, sep="*" ,end=",")
```
(a) `U*10,V*20,W*30,`   (b) `10*U,20*V,30*W,`

(c) `10,20,30,U*V*W*`   (d) `Error`

49. What will be the output of the following Python code ?
```
L =  [10,   20]
L1=[30,    40]
L2=[50,    60]
L.append(L1)
L.extend(L2)
print(L)
```
(a) `[60, 50, 40, 30, 20, 10]`

(b) `[10, 20, 30, 40, 50, 60]`

(c) `[10, 20, 30, 40, [50, 60]]`

(d) `[10, 20, [30, 40], 50, 60]`

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SECTION – C

Case Study based Questions

This section consists of 6 Questions (50 - 55). Attempt any 5 questions.

Nisha, an intern in ABC Pvt. Ltd., is developing a project using the csv module in Python. She has partially developed the code as follows leaving out statements about which she is not very confident. The code also contains errors in certain statements. Help her in completing the code to read the desired CSV File named "Employee.csv"

```
#CSV File Content

ENO,NAME,DEPARTMENT

E1,ROSHAN SHARMA,ACCOUNTS

E2,AASMA KHALID,PRODUCTION

E3,AMRIK GILL,MARKETING

E4,SARAH WILLIAMS,HUMAN RESOURCE

#incomplete Code with Errors

import CSV                                    #Statement-1

with open (____, _____, newline='')as File:  #Statement-2

    ER = csv._____                          #Statement-3

    for R in range(ER) :                     #Statement-4

        if _____ == "ACCOUNTS" :          #Statement-5

            print (____, _____)              #Statement-6
```

50. Nisha gets an Error for the module name used in Statement-1. What should she write in place of CSV to import the correct module ?

   (a) `file`   (b) `csv`

   (c) `Csv`   (d) `pickle`

51. Identify the missing code for blank spaces in the line marked as Statement-2 to open the mentioned file.

    (a) `"Employee.csv","r"`   (b) `"Employee.csv","w"`

    (c) `"Employee.csv","rb"`   (d) `"Employee.csv","wb"`

52. Choose the function name (with parameter) that should be used in the line marked as Statement-3.

    (a) `reader(File)`   (b) `readrows(File)`

    (c) `writer(File)`   (d) `writerows(File)`

53. Nisha gets an Error in Statement-4. What should she write to correct the statement ?

    (a) `for R in ER:`   (b) `while R in range(ER):`

    (c) `for R = ER:`   (d) `while R == ER:`

54. Identify the suitable code for blank space in Statement-5 to match every row's 3rd property with "ACCOUNTS".

    (a) `ER[3]`   (b) `R[2]`

    (c) `ER[2]`   (d) `R[3]`

55. Identify the suitable code for blank space in Statement-6 to display every Employee's Name and corresponding Department ?

    (a) `ER[1], R[2]`   (b) `R[1], ER[2]`

    (c) `R[1], R[2]`   (d) `ER[1], ER[2]`

___

ANSWER KEY – TERM 1 (Computer Science)

CBSE Term 1CBSE Term 1

Series : SSJ/2   SET : 4

1	2	3	4	5	6	7	8	9	10
B , D	C	D	C	C	C	D	C	B	D
11	12	13	14	15	16	17	18	19	20
A	C	A	B	B	C	B	A	C	D
21	22	23	24	25	26	27	28	29	30
A	C	B	D	A	C	B	D	A	D
31	32	33	34	35	36	37	38	39	40
A	D	C	C	D	C	A	D	C	B
41	42	43	44	45	46	47	48	49	50
C	C	C	A	C	D	C	B	D	B
51	52	53	54	55					
A	A	A	B	C					

CBSE 2022 TERM-2 QP WITH MARKING SCHEME

Maximum Marks: 35   Time: 2 hours

General Instructions :
   i.   This question paper is divided into **3 Sections – A, B and C**
   ii. **Section A**, consists of **7** questions **(1-7)**. Each question carries **2** marks.
   iii. **Section B**, consists of **3** questions **(8-10)**. Each question carries **3** marks.
   iv. **Section C**, consists of **3** questions **(11-13)**. Each question carries **4** marks.
   v.   Internal choices have been given for question numbers **7**, **8** and **12**.

		Section -A (Each question carries 2 marks)	
1.		"Stack is a linear data structure which follows a particular order in which the operations are performed." What is the order in which the operations are performed in a Stack ? Name the List method/function available in Python which is used to remove the last element from a list implemented stack. Also write an example using Python statements for removing the last element of the list.	2

	Ans	`Order of operations performed in a Stack is`
		`LIFO (Last In First Out)`
		
		`The List method in Python to remove the last element`
		`from a list implemented stack is`
		
		`pop()`
		`OR`
		`pop(-1)`
		`OR`
		`pop`
		
		`Example:`
		`L=[10,20,30,40]`
		`L.pop() OR L.pop(-1)`
		
		`OR`
		
		`Any other appropriate example`	

		(1 mark for writing correct order) *(½ mark for writing pop or any other correct method/function)* *(½ mark for writing correct Python code of an example)* *OR* *(1 mark for writing correct order)* *(1 mark for correct Python statement to demonstrate the pop() function)* *(Note: FILO - First In Last Out, may also be considered)*	

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2.	(i)	Expand the following : **VoIP, PPP**	1
	Ans	**VoIP : Voice over Internet Protocol** **PPP : Point to Point Protocol**	
		(½ mark each for writing correct expansion)	
	(ii)	Riya wants to transfer pictures from her mobile phone to her laptop. She uses Bluetooth technology to connect two devices. Which type of network (PAN/LAN/MAN/WAN) will be formed in this case?	1
	Ans	**PAN/ Personal Area Network**	
		(1 mark for correct type of network)	
3.		Differentiate between the terms Attribute and Domain in the context of Relational Data Model.	2
	Ans	(see table below)	
		(1 mark each for writing any correct explanation of Attribute and Domain)	

Answer to Q3

Attribute	**Domain**
The column/field of a table/relation is known as an attribute.	**It is a set of permissible values from which attributes can take/obtain required value.**

For example:
Table: Student

Name	Class	Marks
aaa	**XII**	**90**
bbb	**X**	**99**

Name, Class and Marks are attributes	**The attribute class has domain of X, XII**

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4. — Consider the following SQL table MEMBER in a SQL Database CLUB: — **2**

Table: MEMBER

M_ID	NAME	ACTIVITY
M1001	Amina	GYM
M1002	Pratik	GYM
M1003	Simon	SWIMMING
M1004	Rakesh	GYM
M1005	Avneet	SWIMMING

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		Assume that the required library for establishing the connection between Python and MYSQL is already imported in the given Python code. Also assume that DB is the name of the database connection for table MEMBER stored in the database CLUB.
		
		Predict the output of the following code:
		
		``
		MYCUR = DB.cursor()
		MYCUR.execute("USE CLUB")
		MYCUR.execute("SELECT * FROM MEMBER WHERE ACTIVITY='GYM'")
		R=MYCUR.fetchone()
		for i in range(2):
		    R=MYCUR.fetchone()
		    print(R[0], R[1], sep ="#")
		``	

	Ans	**M1002#Pratik** **M1004#Rakesh**	
		(1 mark for writing each correct line of output) *(Note: Deduct ½ mark for missing # or writing the output in a single line OR writing any additional line along with the correct output)*	
5.		Write the output of the SQL queries (a) to (d) based on the table **VACCINATION_DATA** given below: TABLE: **VACCINATION_DATA** <table><tr><th>VID</th><th>Name</th><th>Age</th><th>Dose1</th><th>Dose2</th><th>City</th></tr><tr><td>101</td><td>Jenny</td><td>27</td><td>2021-12-25</td><td>2022-01-31</td><td>Delhi</td></tr><tr><td>102</td><td>Harjot</td><td>55</td><td>2021-07-14</td><td>2021-10-14</td><td>Mumbai</td></tr><tr><td>103</td><td>Srikanth</td><td>43</td><td>2021-04-18</td><td>2021-07-20</td><td>Delhi</td></tr><tr><td>104</td><td>Gazala</td><td>75</td><td>2021-07-31</td><td>NULL</td><td>Kolkata</td></tr><tr><td>105</td><td>Shiksha</td><td>32</td><td>2022-01-01</td><td>NULL</td><td>Mumbai</td></tr></table>	2
	(a)	``` SELECT Name, Age FROM VACCINATION_DATA WHERE Dose2 IS NOT NULL AND Age > 40; ```	
	Ans	<table><tr><th>Name</th><th>Age</th></tr><tr><td>Harjot</td><td>55</td></tr><tr><td>Srikanth</td><td>43</td></tr></table>	
		(½ mark for the correct output) *(Note: Ignore column heading of the output and order of the output rows)*	
	(b)	``` SELECT City, COUNT(*) FROM VACCINATION_DATA GROUP BY City; ```	

Ans	City	COUNT(*)
	Delhi	2
	Mumbai	2
	Kolkata	1

(½ mark for the correct output)
(Note: Ignore column heading of the output and order of the output rows)

(c) `SELECT DISTINCT City FROM VACCINATION_DATA;`

Ans	City
	Delhi
	Mumbai
	Kolkata

(½ mark for the correct output)
(Note: Ignore column heading of the output and order of the output rows)

(d) `SELECT MAX(Dose1),MIN(Dose2)FROM VACCINATION_DATA;`

Ans	MAX(Dose1)	MIN(Dose2)
	2022-01-01	2021-07-20

(½ mark for the correct output)
(Note: Ignore column heading of the output and order of the output rows)

6   Write the output of SQL queries (a) and (b) based on the following two tables DOCTOR and PATIENT belonging to the same database :   **2**

Table: **DOCTOR**

DNO	DNAME	FEES
D1	AMITABH	1500
D2	ANIKET	1000
D3	NIKHIL	1500
D4	ANJANA	1500

Table: **PATIENT**

PNO	PNAME	ADMDATE	DNO
P1	NOOR	2021-12-25	D1
P2	ANNIE	2021-11-20	D2
P3	PRAKASH	2020-12-10	NULL
P4	HARMEET	2019-12-20	D1

(a) `SELECT DNAME, PNAME FROM DOCTOR`
`NATURAL JOIN PATIENT ;`

Ans	DNAME	PNAME
	AMITABH	NOOR
	ANIKET	ANNIE
	AMITABH	HARMEET

(1 mark for writing correct output)

Note:
Deduct ½ mark for any additional row along with the correct rows
Ignore column heading of the output and order of the output rows

(b)
```
SELECT PNAME, ADMDATE, FEES
FROM PATIENT P, DOCTOR D
WHERE D.DNO = P.DNO AND FEES > 1000;
```

Ans	PNAME	ADMDATE	FEES
	NOOR	2021-12-25	1500
	HARMEET	2019-12-20	1500

(1 mark for writing correct output)

Note:
Deduct ½ mark for any additional row along with the correct rows
Ignore column heading of the output and order of the output rows

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7. Differentiate between Candidate Key and Primary Key in the context of Relational Database Model. **2**

Ans A table may have more than one or a combination of attribute(s)that identifies a tuple uniquely. All such attribute(s) are known as Candidate Keys.

Out of all the Candidate keys, the most appropriate one, which is used for unique identification of the Tuples, is called the Primary Key.

Example:
Table: **BANK**

ACNO	NAME	PHONE
10001	RISHABH	9810876677
10031	ARNAV	9810876123
10064	ARNAV	9810875577
10076	GURSHARAN	9810871144

Candidate Keys: ACNO, PHONE
Primary Key: ACNO

(2 marks for correct explanation OR example given to differentiate the keys)

OR
(1 mark for writing only the correct explanation/example of candidate key)
(1 mark for writing only the correct explanation/example of primary key)

<table>
<tr><td colspan="3" align="center">OR</td><td>2</td></tr>
<tr><td></td><td></td><td>Consider the following table PLAYER :

Table: PLAYER

<table><tr><th>PNO</th><th>NAME</th><th>SCORE</th></tr><tr><td>P1</td><td>RISHABH</td><td>52</td></tr><tr><td>P2</td><td>HUSSAIN</td><td>45</td></tr><tr><td>P3</td><td>ARNOLD</td><td>23</td></tr><tr><td>P4</td><td>ARNAV</td><td>18</td></tr><tr><td>P5</td><td>GURSHARAN</td><td>42</td></tr></table></td><td></td></tr>
<tr><td></td><td>(a)</td><td>Identify and write the name of the most appropriate column from the given table PLAYER that can be used as a Primary key.</td><td></td></tr>
<tr><td>Ans</td><td></td><td>PNO</td><td></td></tr>
<tr><td></td><td></td><td><i>(1 mark for mentioning PNO)</i>

<i>(Note: Don't deduct marks, if any additional column name is also mentioned along with PNO)</i></td><td></td></tr>
<tr><td></td><td>(b)</td><td>Define the term Degree in relational data model. What is the Degree of the given table PLAYER ?</td><td></td></tr>
<tr><td>Ans</td><td></td><td>Total number of columns/attributes in a table/relation is known as its Degree.

The Degree of the given table is 3.</td><td></td></tr>
<tr><td></td><td></td><td><i>(½ mark for writing/explaining with example the correct meaning of Degree)</i>
<i>(½ mark writing correct Degree of the given table)</i></td><td></td></tr>
</table>

Section -B
(Each question carries 3 marks)

8.

- Write the definition of a user defined function **PushNV(N)** which accepts a list of strings in the parameter **N** and **pushes** all strings which have no vowels present in it, into a list named **NoVowel**.
- Write a program in Python to input 5 Words and **push** them one by one into a list named **All**.

  The program should then use the function **PushNV()** to create a stack of words in the list **NoVowel** so that it stores only those words which do not have any vowel present in it, from the list **All**.
  Thereafter, **pop** each word from the list **NoVowel** and display the popped word. When the stack is empty, display the message **"EmptyStack"**.

  For example:
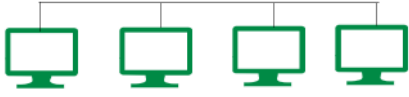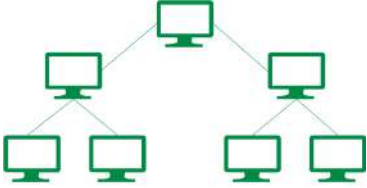
  If the Words accepted and pushed into the list **All** are
  ['DRY', 'LIKE', 'RHYTHM', 'WORK', 'GYM']

3

Then the stack **NoVowel** should store
['DRY', 'RHYTHM', 'GYM']

And the output should be displayed as

GYM RHYTHM DRY EmptyStack

| | Ans | ```
def PushNV(N):
    for W in N :
        for C in W :
            if C.upper() in  'AEIOU':
                break
        else:
            NoVowel.append(W)
All=[]
NoVowel=[]

for i in range(5) :
    All.append(input('Enter a Word: '))

PushNV(All)

while NoVowel :
    print(NoVowel.pop(), end=' ')
else :
    print('EmptyStack')

OR

Any other correct equivalent code
``` | |

| | | *(½ mark for checking vowels correctly, ignore case sensitivity)*
(½ mark for pushing strings into the stack NoVowel)
(½ mark for reading 5 words from the users)
(½ mark for assigning 5 words into All)
(½ mark for writing correct code to pop and display the words from NoVowel)
(½ mark for writing correct code to check empty stack and display the message 'EmptyStack') | |

| | | **OR** | |

| | | ● Write the definition of a user defined function **Push3_5(N)** which accepts a list of integers in a parameter **N** and **pushes** all those integers which are **divisible by 3 or divisible by 5** from the list **N** into a list named **Only3_5**.
● Write a program in Python to input 5 integers into a list named **NUM**. The program should then use the function **Push3_5()** to create the stack of the list **Only3_5**. Thereafter **pop** each integer from the list **Only3_5** and display the popped value. When the list is empty, display the message **"StackEmpty"**. | |

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		For example:
		If the integers input into the list **NUM** are :
		
		`[10,6,14,18,30]`
		
		Then the stack **Only3_5** should store
		
		`[10,6,18,30]`
		
		And the output should be displayed as
		
		`30 18 6 10 StackEmpty`	

	Ans	```def Push3_5(N):\n for i in N :\n if i%3==0 or i%5==0 :\n Only3_5.append(i)\n\nNUM=[]\nOnly3_5=[]\n\nfor i in range(5):\n NUM.append(int(input('Enter an Integer: ')))\n\nPush3_5(NUM)\n\nwhile Only3_5 :\n print(Only3_5.pop(), end=' ')\nelse :\n print('StackEmpty')\n\nOR\nAny other correct equivalent code```	
		(½ mark for checking divisibility correctly) *(½ mark for pushing integers into the stack Only3_5)* *(½ mark for reading 5 integers from the users)* *(½ mark for assigning those 5 integers into NUM)* *(½ mark for writing correct code to pop and display the integers from Only3_5)* *(½ mark for writing correct code to check empty stack and display the message 'StackEmpty')*	
9.	(i)	A SQL table **ITEMS** contains the following columns: `INO, INAME, QUANTITY, PRICE, DISCOUNT` Write the SQL command to remove the column **DISCOUNT** from the table.	1
	Ans	```ALTER TABLE ITEMS\nDROP COLUMN DISCOUNT;\nOR\nALTER TABLE ITEMS\nDROP DISCOUNT;```	
		(½ mark for writing ALTER TABLE ITEMS) *(½ mark for writing DROP COLUMN DISCOUNT OR DROP DISCOUNT)*	

	(ii)	Categorize the following SQL commands into **DDL** and **DML** : CREATE, UPDATE, INSERT, DROP	2
	Ans	DDL Commands : **CREATE, DROP** DML Commands : **INSERT, UPDATE**	
		(½ Mark each for writing the correct DDL/DML commands)	
10.		Rohan is learning to work upon Relational Database Management System (RDBMS) application. Help him to perform following tasks:	3
	(a)	To open the database named **"LIBRARY"**.	
	Ans	**USE LIBRARY ;**	
		(1 Mark for writing correct SQL command)	
	(b)	To display the names of all the tables stored in the opened database.	
	Ans	**SHOW TABLES;** **OR** **SHOW TABLES FROM LIBRARY;**	
		(1 Mark for writing correct SQL command)	
	(c)	To display the structure of the table **"BOOKS"** existing in the already opened database **"LIBRARY"**.	
	Ans	**DESCRIBE BOOKS ;** **OR** **DESC BOOKS ;**	
		(1 Mark for writing correct SQL command)	
		Section - C **(Each question carries 4 marks)**	
11.		Write SQL queries for (a) to (d) based on the tables PASSENGER and FLIGHT given below:	4

Table : **PASSENGER**

PNO	NAME	GENDER	FNO
1001	Suresh	MALE	F101
1002	Anita	FEMALE	F104
1003	Harjas	MALE	F102
1004	Nita	FEMALE	F103

Table: **FLIGHT**

FNO	START	END	F_DATE	FARE
F101	MUMBAI	CHENNAI	2021-12-25	4500
F102	MUMBAI	BENGALURU	2021-11-20	4000
F103	DELHI	CHENNAI	2021-12-10	5500
F104	KOLKATA	MUMBAI	2021-12-20	4500
F105	DELHI	BENGALURU	2021-01-15	5000

	(a)	Write a query to change the fare to 6000 of the flight whose FNO is F104.	
	Ans	`UPDATE FLIGHT` `SET FARE=6000 WHERE FNO="F104";`	
		(½ Mark for writing `UPDATE FLIGHT`*)* *(½ Mark for writing* `SET FARE=6000 WHERE FNO="F104"`*)*	
	(b)	Write a query to display the total number of `MALE` and `FEMALE` `PASSENGERS`.	

	Ans	`SELECT GENDER, COUNT(*) FROM PASSENGER`
		`GROUP BY GENDER;`
		`OR`
		`SELECT COUNT(*) FROM PASSENGER`
		`GROUP BY GENDER;`	

		(½ mark for writing SELECT part correctly) *(½ mark for writing GROUP BY GENDER;)* ***OR*** *(any alternate correct uses of COUNT() is acceptable)*	
	(c)	Write a query to display the **NAME**, corresponding **FARE** and **F_DATE** of all `PASSENGERS` who have a flight to **START** from `DELHI`.	

	Ans	`SELECT NAME, FARE, F_DATE FROM PASSENGER P, FLIGHT F`
		`WHERE F.FNO= P.FNO AND START = 'DELHI';`
		`OR`
		`SELECT NAME, FARE, F_DATE FROM PASSENGER, FLIGHT`
		`WHERE PASSENGER.FNO= FLIGHT.FNO AND START = 'DELHI';`
		`OR`
		`SELECT NAME, FARE, F_DATE FROM PASSENGER, FLIGHT`
		`WHERE PASSENGER.FNO= FLIGHT.FNO AND START LIKE 'DELHI';`
		`OR`
		`SELECT NAME,FARE,F_DATE FROM PASSENGER NATURAL JOIN FLIGHT`
		`WHERE START = 'DELHI';`
		
		`OR`
		`Any other correct and equivalent query`	

		(½ mark for writing SELECT - FROM part correctly) *(½ mark for writing WHERE part correctly)*	
	(d)	Write a query to delete the records of flights which end at Mumbai.	

	Ans	`DELETE FROM FLIGHT`
		`WHERE END = "MUMBAI";`
		`OR`
		`DELETE FROM FLIGHT`
		`WHERE END LIKE "MUMBAI";`	

		(½ mark for writing DELETE FROM FLIGHT) *(½ mark for writing WHERE part correctly)*	

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12.	(i)	Differentiate between Bus Topology and Tree Topology. Also, write one advantage of each of them.	2
	Ans		

<table>
<tr><th>Bus Topology</th><th>Tree Topology</th></tr>
<tr><td></td><td></td></tr>
<tr><td>In bus topology, each communicating device connects to a single transmission medium, known as bus.</td><td>It is a hierarchical topology, in which there are multiple branches and each branch can have one or more basic topologies like star, ring and bus.</td></tr>
<tr><td>Advantage:
It is very cost-effective as compared to other network topologies.</td><td>Advantage:
It is easier to set-up multi-level plans for the network.</td></tr>
</table>

OR
Any other correct difference/definition/advantages

(1 Mark for mentioning any one correct difference between the topologies)
(½ mark each for writing any one advantage of Bus and Tree Topologies)

OR

(½ mark each for conveying correct understanding of Bus and Tree Topology using/not using diagram)
(½ mark each for writing any one advantage of Bus and Tree Topologies)

OR

Differentiate between HTML and XML.

Ans

HTML	XML
It stands for HyperText Markup Language.	It stands for eXtensible Markup Language.
It contains predefined tags which are used to design webpages.	It contains user defined tags to describe and store the data.

OR
Any other valid difference/characteristic

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		(Full 2 Marks for writing any one correct difference between HTML and XML)	
		OR	
		(1 Mark for writing correct explanation of HTML) **OR** *(½ Mark for writing full form of HTML)*	
		(1 Mark for writing correct explanation of XML) **OR** *(½ Mark for writing full form of XML)*	
	(ii)	What is a web browser ? Write the names of any two commonly used web browsers.	2

	Ans	`A Web browser is a software/tool, which allows us to view/access the content of WebPages.`
		`OR`
		`It is a Client software program that is used to access various kinds of Internet resources using HTTP.`
		
		`Examples :`
		`Google Chrome, Microsoft Edge, Mozilla Firefox, Apple Safari, Opera, Chromium, etc. (ANY TWO)`	

		(1 Mark for writing correct explanation of Web-Browser) *(½ Mark for writing each correct name of two Web-Browsers)*	
13.		Galaxy Provider Ltd. is planning to connect its office in Texas, USA with its branch at Mumbai. The Mumbai branch has 3 Offices in three blocks located at some distance from each other for different operations – ADMIN, SALES and ACCOUNTS. As a network consultant, you have to suggest the best network related solutions for the issues/problems raised in (a) to (d), keeping in mind the distances between various locations and other given parameters. Layout of the Offices in the Mumbai branch:	4

Shortest distances between various locations:

ADMIN Block to SALES Block	300 m
SALES Block to ACCOUNTS Block	175 m
ADMIN Block to ACCOUNTS Block	350 m
MUMBAI Branch to TEXAS Head Office	14000 km

		Number of Computers installed at various locations are as follows:		
		ADMIN Block	255	
		ACCOUNTS Block	75	
		SALES Block	30	
		TEXAS Head Office	90	

	(a)	It is observed that there is a huge data loss during the process of data transfer from one block to another. Suggest the most appropriate networking device out of the following, which needs to be placed along the path of the wire connecting one block office with another to refresh the signal and forward it ahead. (i) MODEM (ii) ETHERNET CARD (iii) REPEATER (iv) HUB	
	Ans	**(iii) REPEATER**	
		(1 Mark for correct identification of the Networking Device)	
	(b)	Which hardware networking device out of the following, will you suggest to connect all the computers within each block ? (i) SWITCH (ii) MODEM (iii) REPEATER (iv) ROUTER	
	Ans	**(i) SWITCH**	
		(1 Mark for correct identification of the Networking Device)	
	(c)	Which service/protocol out of the following will be most helpful to conduct live interactions of employees from Mumbai Branch and their counterparts in Texas ? (i) FTP (ii) PPP (iii) SMTP (iv) VoIP	
	Ans	**(iv) VoIP**	
		(1 Mark for correct identification of the service/protocol)	
	(d)	Draw the cable layout (block to block) to efficiently connect the three offices of the Mumbai branch.	
	Ans	 **OR any alternate cable layout**	
		(1 Mark for drawing correct cable layout)	