तत् त्वं पूषन् अपावृणु
केन्द्रीय विद्यालय संगठन

केंद्रीय विद्यालय संगठन,

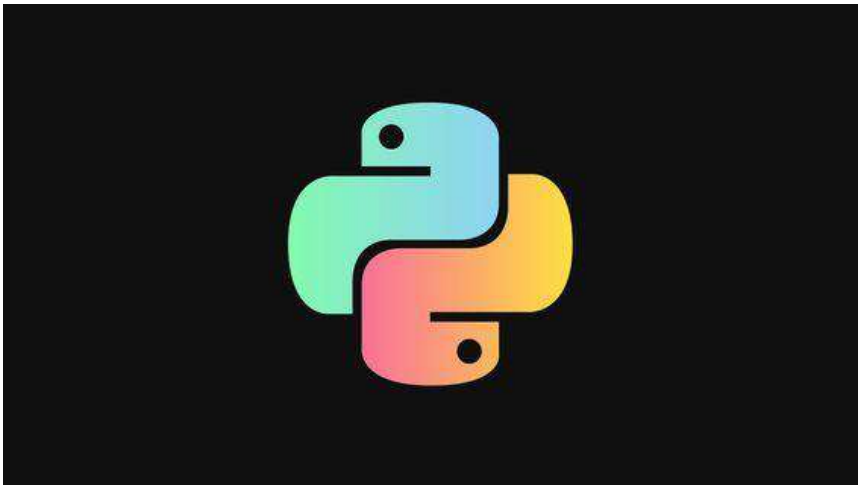
बेंगलुरु संभाग

KENDRIYA VIDYALAYA SANGATHAN
BENGALURU REGION

STUDENT SUPPORT MATERIAL

Computer Science (083)

CLASS XII



Session 2024-2025

केन्द्रीय विद्यालय संगठन

KENDRIYA VIDYALAYA SANGATHAN

बेंगलुरू संभाग / BENGALURU REGION

STUDY MATERIAL SESSION (2024 -25)

CLASS XII COMPUTER SCIENCE

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CONTENT PREPARATION TEAM

TOPIC	S. NO.	NAME OF TEACHER(PGT CS)
Revision of Python Covered in Class- XI	1	SH. ASHOK SENGUPTA
	2	MS. DIVYA C.K.
Function and Exception Handling	3	MS. PREETI SARKAR
	4	MS. UMA TIWARI
File Introduction and Text File	5	MS. ANSHU JAIN
	6	SH. VIMAL SHARMA
Binary File	7	SH. AMIT KUMAR GUPTA
	8	SH. SUNIL KUMAR T
CSV File	9	MS. SUMITHA
	10	MS. NEHA PATHAK
Data Structure	11	SH. RAMESHA K.S.
	12	MS. KIRAN KUMARI K
Computer Networks	13	MS. POOJA KHARE
	14	MS. B. SHARADHA
Database Management and Mysql	15	MS. SONAM DUTTA
	16	MS. LAXMI P.
Interface of Python with Mysql	17	SH. AMIT KUMAR SINHA
	18	SH. SUNIL KUMAR C. K.
03 Sets of Sample Question Papers with Marking Scheme	19	SH. GOVERDHAN SATISH
	20	MS. SONIA ARORA

Syllabus

Computer Science (2024-25)
CLASS XII Code No. 083

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	Practicals
1	Computational Thinking and Programming – 2	40	70	50
2	Computer Networks	10	15	---
3	Database Management	20	25	20
	Total	70	110	70

4. Unit wise Syllabus

Unit 1: 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)**
- **Exception Handling: Introduction, handling exceptions using try-except-finally blocks**
- **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 writer(),writerow(),writerows() and read from a csv file using reader()**
- **Data Structure: Stack, operations on stack (push & pop), implementation of stack using list.**

Unit 2: 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, Packetswitching)

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 3: 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 connect(),cursor(), execute(), commit(), fetchone(), fetchall(), rowcount, creating database connectivity applications, use of %s format specifier or format() to perform queries

INDEX

Unit : 1 Review of Class - 11

Introduction to Python Programming Language

Python features:

- **Interpreter based programming language**: Line by line execution of Source code.
- **Free and Open source**: Source code is available free of cost. Free to use for commercial purposes.
- **Portable**: Same code can be used for different machines.
- **Object Oriented Support**: Supports both procedural and OOPs.
- **Extensible**: Python code can be written in other languages.
- **Dynamically typed**: Variable datatype can be decided at runtime.
- **Robust Standard Library**: Extensive standard library available for anyone to use.
- **Easy to code and read**: Simple syntax, indented blocks make it easy to read and code.

Coding modes in python:

- **Interactive mode**: Interactive mode is used when a user wants to run one single line or one block of code. In interactive mode, commands typed at the IDL prompt are executed when the Enter key is pressed.
- **Script mode**: Script mode is where you put a bunch of commands into a file (a script), and then tell Python to run the file. Script mode runs your commands sequentially.

Indentation:

- Indentation refers to the spaces at the beginning of a code line. Where in other programming languages the indentation in code is for readability only, the indentation in Python is very important. Python uses indentation to indicate a block of code.

Python Comments:

- Comments are statements in python code that are ignored by the interpreter.
- Comments can be used to explain Python code.
- Comments can be used to make the code more readable.
- Single line comments: These are the statements that start with #

```
#This is a comment
print("Hello, World!")
```

```
print("Hello, World!") #This is a comment
```

- Multiline comments: Since Python will ignore string literals that are not assigned to a variable, you can add a multiline string (triple quotes) in your code, and place your comment inside it:

```
"""
This is a comment
written in
more than just one line
"""
print("Hello, World!")
```

Python character set:

- A character set is a set of valid characters acceptable by a programming language in scripting.
- Python supports all ASCII / Unicode characters that include:
  - Alphabets: All capital (A-Z) and small (a-z) alphabets.
  - Digits: All digits from 0-9.
  - Alphabets: All capital (A-Z) and small (a-z) alphabets.
  - Special Symbols: Python supports all kinds of special symbols - " ' l ; : ! ~ @ # $ % ^ ` & * ( ) _ + – = { } [ ] \ .
  - White Spaces: White spaces like tab space, blank space, newline, and carriage return.
  - Other: All ASCII and UNICODE characters are supported by Python that constitutes the Python character set.

Python Tokens:

- A token is the smallest individual unit in a python program.
- All statements and instructions in a program are built with tokens.
- Token Types:
  - **Keywords**: Keywords are reserved by python environment and cannot be used as identifier. There are 35 keywords in python. You may try to use the following code to get a list of keywords supported in your python version.

```
import keyword
print(keyword.kwlist)
```

['False', 'None', 'True', 'and', 'as', 'assert', 'async', 'await', 'break', 'class', 'continue', 'def', 'del', 'elif', 'else', 'except', 'finally', 'for', 'from', 'global', 'if', 'import', 'in', 'is', 'lambda', 'nonlocal', 'not', 'or', 'pass', 'raise', 'return', 'try', 'while', 'with', 'yield']

  - **Identifier**: Identifiers are the names given to any variable, function, class, list, methods, etc. for their identification. Python is a case-sensitive language, and it has some rules and regulations to name an identifier. Here are the rules.
    - An Identifier starts with a capital letter (A-Z) , a small letter (a-z) or an underscore(_).
    - It can have digits but cannot start with a digit.
    - An identifier can’t be a keyword.
    - My_name, __init__, Seven10 are valid examples.
    - 20dollers, my.var, True are invalid examples.
  - **Literals**: Literals are the values stored in program memory and are often referred to by an identifier.

- **String Literals**: The text written in single, double, or triple quotes represents the string literals in Python.

```
[ ]  x = "Hello"
     y = 'My Friend'
     z = "25"
     n = '''My days in
     my school.'''
```

  - **Escape characters**: To insert characters that are illegal in a string, use an escape character. An escape character is a backslash \ followed by the character you want to insert. Some of the escape characters are as under:

Escape Character	Result
\'	Single Quote
\"	Double Quote
\\	Backslash
\n	New Line
\t	Tab
\b	Back space

- **Numeric Literals**: A number represented in various forms is a Numeric Literal.
  - **Integer Literal**: It includes both positive and negative numbers along with 0. It doesn't include fractional parts. It can also include binary, decimal, octal, hexadecimal literal.
  - **Float Literal**: It includes both positive and negative real numbers. It also includes fractional parts. 99.62, 0.35E-7 are valid float literals.
  - **Complex Literal**: It includes a+bi numeral, here a represents the real part and b represents the complex part.
- **Boolean Literal**: Boolean literals have only two values in Python. These are True and False.
- **Special (None) Literal**: Python has a special literal 'None'. It is used to denote nothing, no values, or the absence of value.
- **Collection Literal**: Literals collections in python includes list, tuple, dictionary, and sets.

- **Operators**: Operators are responsible for performing various operations in Python. The operators are of two types Unary (Operates on single operand) and Operators that operates on two operands (binary).
  - **Arithmetic Operators**: Arithmetic operators are used with numeric values to perform common mathematical operations:

Operators	Name	Example
+	Addition	10+20 gives 30
-	Subtraction	20-10 gives 10
*	Multiplication	30*2 gives 60
/	Division	12/3 gives 4.0
//	Floor Division	10//3 gives 3 10.0//3 gives 3.0
%	Modulus	10%4 gives 2
**	Exponentiation	3**2 gives 9

- **Assignment Operators**: Assignment operators are used to assign values to variables:

Operator	Example	Equivalent
=	n = 10	n = 10
+=	n+=10	n=n+10
-=	n-=10	n=n-10
*=	n*=10	n=n*10
/=	n/=10	n=n/10
//=	n//=10	n=n//10
**=	n**=10	n=n**10
%=	n%=10	n=n%10

- **Relational Operators**: These are used to compare two values and returns a True or False answer.

Operator	Name	Example
==	Equal to	10 == 10 is True
!=	Not Equal to	10 != 10 is False
>	Greater Than	10 > 5 is True
<	Less Than	5 < 10 is False
>=	Greater than or Equal to	10>=5 is True
<=	Less than or Equal to	5 <=10 is True

- **Logical Operators**: They are generally used along with Relational Operators to extend their scope. However, python allows them to be used independently.

Operator	Description	Example
And	Returns True if both statements are true	10 > 20 and 30 <40 will return False
Or	Return True if one or both the statements are True	10 > 20 or 30<40 will return True
Not	Reverses the result	not True is False

- **Membership Operator**: Membership operators are used to test if a sequence is presented in an object/collection:

Operator	Description	Example
In	Returns True if a sequence with the specified value is present in the object	10 in [5,10,20] will return True
not in	Returns True if a sequence with the specified value is not present in the object	20 not in [5,10,15] will return True

- **Identity Operator**: The Identity operator returns true only if two objects occupy the same memory location.

Operator	Description	Example
Is	Returns True if both variables are the same object	[10,20,30] is [10,20,30] will return False since both occupy different memory locations even if they are equal
is not	Returns True if both variables are not the same object	10 is not 10 will return False since both are same objects

- There are other operators like the **Bitwise** operators and **lambda** operator (function) - These are not in syllabus.
- **Operator precedence**: In a mathematical or logical expression the operator precedence plays an important role to decide which operator will be executed first. The following table elaborates their precedence.

Operator	**Remarks**
()	Even though () is not an operator but it plays an important roe in deciding which part of the expression should be evaluated first.
**	The unique feature of ** is that it is the only operator that is evaluated from right to left
*, /, //, %	All the four have same precedence
+, -	They are next
== != > >= < <= is is not in not in	All the relational, identity and membership operators
Not	Not being a unary operator has precedence over and/or
And	Have higher precedence over or
Or	Lowest precedence

Some Interesting operations using operators that are often asked in Examinations:

Expression	**Output**	**Explanation**
2**3**2	512	Since ** is evaluated from right to left, first 3**2 is evaluated to 9 and 2**9 evaluated 512
10 or 20	10	If the first operand of an "or" expression is true, return the first operand. Otherwise, evaluate and return the second operand.
0 or 10	10	0 is False and hence second operand is returned.
10 and 20	20	If the first operand of an "and" expression is false, return the first operand. Otherwise, evaluate and return the second operand.
Note: Any value is interpreted as "false" for the above purposes if it is 0, 0.0, None, False, or an empty collection. Otherwise, it is interpreted as "true" for the above purposes. So, 10 and 20, being nonzero numbers, are "true."		
25 % -4	-3	Python evaluates the modulus with negative numbers using the formula: **(a//b) * b + a%b == a** 25//-4 gives -7 with floor division.

		-7 * -4 gives 28. Hence a%b must be -3 to make the expression correctly equate to 25. **Note**: The sign of the result is always that of the divisor.

Questions:

Q.1	Which one of the following is not a valid identifier? a) true b) __init__ c) 20Decades d) My_var
Q.2	Which of the following keywords is a python operator? a) for b) break c) is d) else
Q.3	What will be the output of the operation print("\\\\\\") ? a) \\\\\\ b) \\\ c) \\ d) Error
Q.4	What will be the output of the expression print(10+20*10//2**3-5) a) 30 b) 40 c) 1005 d) 130
Q.5	Evaluate the expression print(20%-3)? a) -1 b) -2 c) 2 d) Error
Q.6	What will be the result of the expression True of False and not True or True a) True b) False c) None d) Error
Q.7	What will be the output of the following program? a = {'A':10,'B':20} b = {'B':20, 'A':10} print(a==b and a is b) a) True b) False c) None d) Error
Q.8	Which of the following statements is false for python programming language? a) Python is free and Open source. b) Python is statically typed. c) Python is portable. d) Python is interpreted.

Flow of Control in Python

- Python supports sequential flow of control.
- Python supports branching flow of control using if, elif and else blocks.
- Python supports iteration control using for loop and while loop.

Python if, elif and else blocks:

- Python uses the relational and logical operators along with if and elif to create conditional blocks that executes a set of python statements depending on the truth value of the condition.
- The beginning of a block starts from the next line just after the : symbol and the block is indented.

```
# Program to find the largest of three numbers
a = int(input())
b = int(input())
c = int(input())
if a > b and a > c:
  print(a)
elif b > c:
  print(b)
else:
  print(c)
```

if block

elif block

else block

- There could be a nested if construct as the following program shows:

```
# Program to find the largest of three numbers
a = int(input())
b = int(input())
c = int(input())
if a > b:
  if a > c:
    print(a)
  else:
    print(c)
elif b > c:
  print(b)
else:
  print(c)
```

Nested if block

With respect to the CBSE examination the students should thoroughly understand the construct of if, elif, else and often a question comes where you need to identify the errors in each program.

Q.	Re-write the following program after removing errors, if any, and underline all the corrections made.
	a = input("Enter a number:")
	b = int(input("Enter a number:"))
	if a = b:
	  a + b = a
	else
	  b = b + a
	print(a,b)
	Hint: There are four errors in the program

Python for loop:

- Python for loop is used to iterate a set of python statements till a counter reaches its limit.

```
# A program to find the sum of n numbers
sum = 0
for i in range(1,11):
  sum = sum+i
print(sum)
```

```
55
```

- Python for loop can also be used to iterate over a collection object (List, tuple)/ iterable (string, dictionary) using membership operators.

```
# A program to add 10 to each element of a list of numbers
l = [10,20,30,40,50]
for x in l:
  print(x+10, end=" ")
```

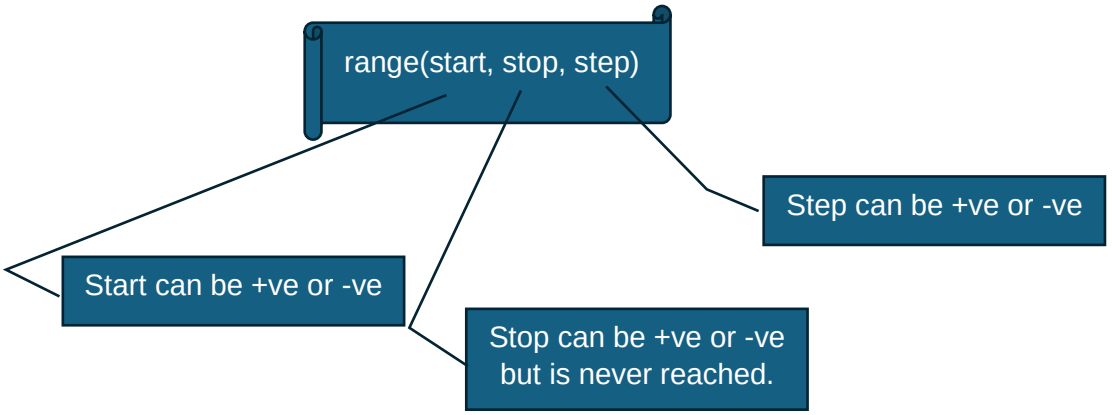
```
20 30 40 50 60
```

- Python while loop is used in situations where we have no idea as when the loop is going to end since there are no counters.

```
# A program to find the reverse of a number
rev = 0
n = 1234
while n > 0:
  rev = rev * 10 + n % 10
  n = n //10
print(rev)
```

```
4321
```

- **range() function in python**: The range() function returns a sequence of numbers, starting from 0 by default, and increments by 1 (by default), and stops before a specified number.



range() example	Output sequence
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(1,11,2)	1 3 5 7 9
range(10,0,-1)	10 9 8 7 6 5 4 3 2 1

- **break statement in a loop**: The break statement stops the loop iteration and exits from the loop.

```
# A program to check for prime number
n = int(input())
for i in range(2, n//2+1):
  if n % i == 0:
    print("Not Prime")
    break
else:
  print("Prime Number")
```

The loops exits if the number n is divisible by any number between to and half of the number

- **continue statement**: Whenever a continue statement is encountered in a loop the remaining statements after the continue statement are not executed and the loop enters next iteration.

```
# A program to print all even numbers between 1 and 100 using continue statement
i = 0
while i < 100:
  i += 1
  if i % 2 != 0:
    continue
  print(i)
```

The continue statement will not print any number that is odd

- **else block in loop**: The else block in a loop is executed when the break statement is not encountered inside the loop.

```
# A program to check for prime number
n = int(input())
for i in range(2, n//2+1):
  if n % i == 0:
    print("Not Prime")
    break
else:
  print("Prime Number")
```

The loop else will be encountered only for a prime number since break will not get executed during any iterations

Students are advised to go through the above content since various operations involving the python data structures, user defined functions, data file handling and database interaction will require a thorough understanding of iteration. In CBSE examination you may not get a direct question from this topic except for a few MCQ or Assertion-Reasoning based question.

	The following question is an ASSERTION AND REASONING based Questions. Mark the correct choice as: i) Both A and R are true, and R is the correct explanation for A ii) Both A and R are true, and R is not the correct explanation for A iii) A is True but R is False iv) A is false but R is True
Q.	ASSERTION: In python loop else block will be executed if the loop successfully terminates after complete iteration. REASON: A python loop else block will not execute if a break statement is encountered in a loop.
Q.	ASSERTION: A continue statement in a loop is mandatory. REASON: A continue statement will skip the remaining statements in the loop after it is encountered.

Python Strings

- Python strings are a set of characters enclosed in single quotes, double quotes, or triple quotes.
- Python strings are immutable - Once a string is created, it cannot be changed. You can create a new string with the desired modifications, but the original string remains unchanged.
- Python Strings are ordered: Strings maintain the order of characters in the sequence. This means that the characters in a string have a definite order, and this order will not change.
- Python Strings are iterable: You can iterate over the characters in a string using loops like for loops or comprehensions.
- Characters in a String are indexable: Each character in a string can be accessed using an index. Indexing starts from 0, so the first character of a string has an index of 0, the second character has an index of 1, and so on.

String examples:

```
# blank string examples
s1 = ""
s2 = str()
```

```
# basic string example
s1 = " Hello World"
s2= "12345"
```

```
# String with escape characters
s = "India is my \"Country\""
```

Accepting a string from user: We can use **input()** method to acquire a string from user.

```
# Accepting a string from user
s = input("Enter a name:")
```

```
Enter a name:Amit
```

The string inside an input() method is a prompt

String operations:

- **Concatenation**: More than one string can be joined using the (+) operator to create a new string.

```
s = "Hello"
t = "World"
n = s + " " + t
print(n)
```

```
Hello World
```

- **Replication**: A string can be multiplied by a number to create a replicated string.

```
s = "New"
t = s * 5
print(t)
```

```
NewNewNewNewNew
```

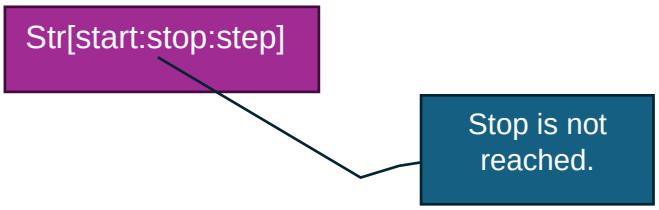
- **Indexing**: Each character of a string can be accessed using two types of indexing.
  - **Forward indexing**: First character of a string has an index 0 and next has 1 and so on.
  - **Reverse indexing**: Last character of the string is having an index of -1 and last but one has -2 and so on.

Forward index	0	1	2	3	4	5
	P	Y	T	H	O	N
Reverse index	-6	-5	-4	-3	-2	-1

We can access any element of the string using indexing.

```
s = "PYTHON"
print(s[0]) # will print P
print(s[4]) # will print O
print(s[-3])# will print H
```

- **Slicing**: A substring can be acquired from an existing string using the slicing operation.




```
[1]  s = "METAMORPHOSIS"
     print(s[0:5]) # METAM
     print(s[2:8:2]) # TMR
     print(s[::-1]) # SISOHPROMATEM
     print(s[-6:-2]) # PHOS
     print(s[-1:-7:-2]) # SSH
```

- **Traversal**: We can traverse a string using iteration and specifically using for loop.
  - **Iterate using membership**:

```
[2]  s = "PYTHON"
     for x in s:
       print(x, end=" ")

     P Y T H O N
```

  - **Iterate using indexing**:

```
[3]  s = "PYTHON"
     for i in range(len(s)):
       print(s[i], end=" ")

     P Y T H O N
```

- **String Methods**: Python has a few built-in and string library methods (also built-in) to manipulate strings. Some of them as elaborated below with examples.
    - **Global Methods**: These methods accept string as a parameter – **methodName(string)**

```
s = "PYTHON"
print(len(s)) # Returns the number of characters in the string
print(max(s))  # Returns the maximum ASCII valued character
print(min(s))  # Returns the minimum ASCII valued character
print(sorted(s)) # Returns a list containing ASCII ordered characters
print(sorted(s, reverse=True)) # Returns a list containing ASCII ordered characters in reverse
```

```
6
Y
H
['H', 'N', 'O', 'P', 'T', 'Y']
['Y', 'T', 'P', 'O', 'N', 'H']
```

    - **String Library Methods**: These methods have the syntax **string.methodName()**

        - **Methods that return True or False**:
        isalnum() – Returns True is the string comprises of only alphabets and digits

```
[8]  s = "PYTHON3"
     print(s.isalnum())
```

```
True
```

        isalpha() – Returns True if all the characters are Alphabets

```
[9]  s = "PYTHON3"
     print(s.isalpha())
```

```
False
```

        isdigit() – Returns True if all the characters are digits.

```
[10] s = "24569"
     print(s.isdigit())
```

```
True
```

        isspace() – Returns True if all the characters are spaces

```
[11] s = "My Dear"
     print(s.isspace())
```

```
False
```

        isupper() – Returns True if all the characters are upper-case alphabets

```
[12] s = "PYTHON"
     print(s.isupper())
```

```
True
```

islower() – Returns True if all the characters are lowercase alphabets

```
[13] s = "python"
     print(s.islower())
```

```
True
```

startswith(substr) – Returns True if a string starts with the given substring.

```
[14] s = "Hello Python"
     print(s.startswith('H'))
```

```
True
```

endswith(substr) – Returns True if a string ends with the given substring.

```
[15] s = "Hello Python"
     print(s.endswith('on'))
```

```
True
```

- **Methods that return a number based on the requirement**:
count(substr) – counts the occurrence of a substring inside a string. The general format of this function is count(substr, start, stop) where stop index is not included. Both start and stop are optional.

```
[16] s = "MAGIC MOMENTS MELODY"
     print(s.count("M"))
```

```
4
```

```
[17] s = "MAGIC MOMENTS MELODY"
     print(s.count("M", 2))
```

```
3
```

The first M is not included since the start index is 2

```
[18] s = "MAGIC MOMENTS MELODY"
     print(s.count("M", 2,10))
```

```
2
```

The first M and the last M are not included since the start index is 2 and stop is 10

index(substr) – Returns the index of the first occurrence of a substring inside a given String. The general format of this method is index(substr, start, stop) where stop index is not included. Both start

and stop are optional.

```
[20] s = "MAGIC MOMENTS MELODY"
     print(s.index("M"))

     0
```

```
[21] s = "MAGIC MOMENTS MELODY"
     print(s.index("M", 2))

     6
```

The first M is not included since the start index is 2 and hence the index value of the next M is 6

```
[22] s = "MAGIC MOMENTS MELODY"
     print(s.index("M", 7, 12))

     8
```

The start is 7 hence first two M's are not included.

find(substr) – Returns the index of the first occurrence of a substring inside a given String. The general format of this method is index(substr, start, stop) where stop index is not included. Both start and stop are optional. This is same as index()

index(substr)	find(substr)
This function throws a ValueError if the substring is missing from the string.	This function returns -1 if the substring is missing from the string.

- **Methods that modify an existing string and returns a new string:**
  capitalize(): Converts the first character of a string to upper case and all other alphabets to lower case. Incase the first character is not an Alphabet, only the remaining alphabets will be converted to lower case.

```
print("final Day".capitalize())

Final day
```

title(): Converts all the first characters of each word of a string to upper case, in case they are alphabets. The remaining alphabets are converted to lower case.

```
print("morNing gloRy floWER".title())

Morning Glory Flower
```

replace(oldsubstr, newsubstr): Replaces all the first parameter with the second parameter and returns a new string.

```
[30] print("GOOGLE".replace("O","*"))

     G**GLE
```

upper(): Converts all the lowercase alphabets in a string to upper case and returns a new string.

```
print("my name".upper())

MY NAME
```

lower(): Converts all the uppercase alphabets in a string to lowercase and returns a new string.

```
[32] print("ARUN".lower())

     arun
```

- **Methods that create a new object from an existing string:**
  partition(substr): Returns a tuple with three elements from a string where the middle element is the substring.

```
[39] s = "MANGO SEASON IS COMING"
     print(s.partition("SEA"))
     # partitioning using first few charecters results in an empty string at the beginning
     print(s.partition("MA"))
     # partitioning using last few charecters results in an empty string at the end
     print(s.partition("ING"))
     # partitioning using a non available substring will result in two empty strings
     print(s.partition("Z"))

     ('MANGO ', 'SEA', 'SON IS COMING')
     ('', 'MA', 'NGO SEASON IS COMING')
     ('MANGO SEASON IS COM', 'ING', '')
     ('MANGO SEASON IS COMING', '', '')
```

split() – Returns a list with a sequence of substrings by eliminating all the spaces and newlines from the existing string.

```
[40] s = "WE LOVE PYTHON"
     print(s.split())

     ['WE', 'LOVE', 'PYTHON']
```

split(substr): Returns a list with a sequence of substrings by eliminating all the occurrences of the substring from the existing string.

```
[41]  s= "MADAM TEACHES ALGEBRA"
      print(s.split("A"))

     ['M', 'D', 'M TE', 'CHES ', 'LGEBR', '']
```

Observe that all the A are removed because of the above method call and since there is no character after the last A, an empty string is introduced.

Questions:

Q.1	What will be the output of the following python statement? s = "HOME ALONE" p = s.split("O") print(p[1][:2]+p[-1]) a) ALNE b) MENE c) MEONE d) MEAL
Q.2	What will be the output of the following python code? s="finaL eXam" print(s.title()) a) FinaL Exam b) Final Exam c) FinaL exam d) Error
Q.3	What is the output of print("hello".find('E'))? a) 1 b) 2 c) -1 d) Error
Q.4	Which of the following statements is False for a python String? a) Python Strings are immutable objects. b) Python Strings can be accessed using indexing. c) Python Strings cannot be empty. d) We can get a substring from an existing string using slicing.
Q.5	What will be the correct output of the following string operation? "MALAYALAM".partition("MA") a) ("MA","LAYAL", "AM") b) ("","MA","LAYALAM") c) ("MA","LAYALA","AM") d) ("MALAYAL","AM","")
Q.6	Which of the following statements will generate an error? st = "PYTHON" t = st*5 Statement(1) u = st[0] + "M" Statement(2) st[0] = "K" Statement(3) st = st + st Statement(4) a) Statement(1) b) Statement(2) c) Statement(3) d) Statement(4)
Q.7	What will be the output of the following python statement? s = "MONGO" print(sorted(s)) a) "GMNOO" b) ["GMNOO"] c) ["G","M","N","O","O"] d) Error
Q.8	What will be the output of the following string operations:

	s="Python is osome good" i) print(s.index('o',13,20)) ii) print(s[2:4]+s[14])

Python List

- **Ordered collection of objects** - Lists maintain the order of elements as they are inserted.
- **Lists are mutable** - Lists can be modified after creation. You can add, remove, or modify elements freely.
- **Heterogenous** - Lists can contain elements of different data types. For example, a list can contain integers, strings, floats, and even other lists.
- **Dynamic** - Lists in Python can grow or shrink in size dynamically. You can append new elements, insert elements at specific positions, or remove elements as needed.
- **Indexed** - Elements in a list are indexed with integers starting from 0. This allows for easy access to individual elements using their index.
- **Nesting** - Lists can contain other lists as elements, allowing for the creation of nested data structures.
- **Built-in Methods** - Python lists come with built-in methods for various operations like sorting, reversing, searching, etc., making them versatile for a wide range of tasks.
- **Iterable** - Lists can be used in iterations using loops (e.g., for loop)
- **Slicing** - Lists support slicing operations, allowing you to extract sublists by specifying a range of indices.

List Examples:

```
# Empty lists
l1 = []
l2 = list()
# Homogenous Lists
l3 = [10,20,30,40]
l4 = ['A','B','C']
l5 = [True, False, True]
# Heterogenous lists
l6 = [10, True, "Arun"]
# Nested List
l7 = [[10,20,30], [5,10,15]]
```

Accepting a list from User: eval() method can be used along with input() method to acquire a list from the console.

```
l1 = eval(input("Enter a list of Numbers:"))
```

```
Enter a list of Numbers:[10,20,30,40]
```

List Operations: Like a String, python lists also support operations like Concatenation, Replication, indexing, slicing and iteration. The only difference is that we can modify the elements of a list using indexing, slicing and index-based iteration. In this study material we shall see this component of python list that makes it unique mutable data structure.

- **Indexing of nested lists**:

Changing list elements using indexing: We can change the elements of a list using indexing and assignment operation.

```
[43] data = [10,20,30,40]
     data[3]=100
     print(data)

     [10, 20, 30, 100]
```

- **Changing the list elements using slicing**: We can change the replace the contents of a list using slicing too. Given below are some interesting examples.

```
     data = [1,2,5,6]
     data[2:2]=[3,4]
     print(data)

     [1, 2, 3, 4, 5, 6]
```

Observe here that the slice 2:2 is not removing any element from the list, but inserting the elements of the new list in the given index 2

```
[45] data = [1,2,5,6]
     data[2:3]=[3,4]
     print(data)

     [1, 2, 3, 4, 6]
```

Observe here that the slice 2:3 is removing element 5 from the list and inserting the elements of the new list in the given index 2

- **Changing list elements using index-based iteration**: We can modify the elements of a list using index-based iteration.

```
[46] data = [10,20,30,40,50]
     for i in range(len(data)):
       data[i]+=10
     print(data)

     [20, 30, 40, 50, 60]
```

- **Deleting elements of a list using del command**: del command may be used to delete one or more than one element of a list either using indexing or using slicing.

```
[48] data = [10,20,30,40,50]
     del data[3]
     print(data)

     [10, 20, 30, 50]
```

```
[49] data = [10,20,30,40,50]
     del data[2:4]
     print(data)

     [10, 20, 50]
```

Note: Deleted elements using del command cannot be retrieved back.

- **List Methods:** Python has a few built-in and list library methods (also built-in) to manipulate lists. Some of them as elaborated below with examples:
    - **Global Methods**: These methods accept string as a parameter –

```
[50] s = [10,20,30,40,50]
     print(len(s)) # Returns the number of elements in the list
     print(max(s))  # Returns the maximum valued element
     print(min(s))  # Returns the minimum valued element
     print(sorted(s)) # Returns a list containing sorted ordered elements
     print(sorted(s, reverse=True)) # Returns a list containing sorted ordered elements in reverse
```

```
5
50
10
[10, 20, 30, 40, 50]
[50, 40, 30, 20, 10]
```

methodName(list)

- **List member methods:** These methods have the format **listName.methodName()**

clear() – Removes all the elements from a list and makes the list empty.

```
[51] s = [10,20,30,40,50]
     s.clear()
     print(s)
```

```
[]
```

copy() – Creates a copy of the existing list and both list occupy different memory locations.

```
[52] s = [10,20,30,40,50]
     p = s.copy()
     print(p)
```

```
[10, 20, 30, 40, 50]
```

append() – Adds an element to the end of an existing list

```
[58] s = [10,20,30,40,50]
     s.append(100)
     print(s)
```

```
[10, 20, 30, 40, 50, 100]
```

extend() – Individually appends the contents of one list to another list

```
[59] s = [10,20,30,40,50]
     s.extend([60,70])
     print(s)
```

```
[10, 20, 30, 40, 50, 60, 70]
```

insert() – Inserts an element to a given index. The remaining elements are automatically shifted to the right.

```
[60] s = [10,20,30,40,50]
     s.insert(4, 100)
     print(s)
```

```
[10, 20, 30, 40, 100, 50]
```

pop() – Removes and returns the last element from the existing list.

```
[61] s = [10,20,30,40,50]
     x = s.pop()
     print(x)
```

```
50
```

pop(index) – Removes and returns the element from the given index.

```
[62] s = [10,20,30,40,50]
     x = s.pop(3)
     print(x)
```

```
40
```

remove(element): Removes the element from the given list without returning the element. Return a ValueError is the element is not in the list.

```
[68] s = [10,20,30,40,50]
     s.remove(40)
     print(s)
```

```
[10, 20, 30, 50]
```

count(element) – Counts and returns the number of occurrences of the given element.

```
[69] s = [1,1,2,2,2,3,3,4,5,5,6,2,2,3]
     print(s.count(2))
```

```
5
```

Note: Unlike count() in String there is only one parameter to count() in list.
index(element, start) – Returns the index of the first occurrence of the given element from the list.

```
[73] s = [10,20,30,10,20,40,50,20]
     print(s.index(20, 3))
```

```
4
```

If the start index is not given, the index() returns the index of first occurrence only.
sort() – Sorts the list in ascending order. Unlike sorted() this method sorts the same list and does not return a new list.

```
[74] s = [5,2,3,6,8]
     s.sort()
     print(s)

     [2, 3, 5, 6, 8]
```

```
[75] s = [5,2,3,6,8]
     s.sort(reverse = True)
     print(s)

     [8, 6, 5, 3, 2]
```

reverse() – Reverses the list based on value (ASCII value)

```
[76] s = [10,20,30,40,50]
     s.reverse()
     print(s)

     [50, 40, 30, 20, 10]
```

Questions:

Q.1	What will be the output of the following list operations? data = [10,20,30,[40,50,60],[70,80]] a) print(data[3]+data[-1]) print(data[-2][-2])
Q.2	What will be the output of the following python program: data = [10,20,30, 60,70] data[3:3]=[40,50] print(data) data.pop(3) print(data) data.extend([10,20]) print(len(data))
Q.3	Ganga is learning to use python Lists. Help her to get the answers of the following operations based on the given list: data = [10,20,30] data[1:3]=[5,10] print(data) data.extend([3,4]) x =data.count(10) print(data[x:]) data.sort() print(data) print(data.pop(2))
Q.4	Write a python program that accepts a list of integers from user and creates a new list from the existing list containing all the numbers that have three or more digits. Eg: for existing list [10,100, 99,200,1000] the new list should be [100,200,1000]
Q.5	Write a python program that accepts a list of countries from user and prints all the countries whose number of alphabets is more than 5.
Q.6	Write a python program that accepts a list of integers from user and prints all the integers that have 8 as the last digit. Eg: for the list [10, 28, 8, 86, 98] the program should print 28 8 98

Q.7	For the given list d=[10,30,20,15,45,50,80,90] what will be the output of the following slicing operation: d[2:7:2] a) [20,15,45] b) [20, 45, 80] c) [30, 15, 50] d) [20, 45]

Python Dictionary

- Python dictionaries are collection of key value pairs enclosed in {}
- Python dictionaries are un-ordered.
- Python dictionary keys are immutable (numbers, string, tuple)
- Python dictionary values are mutable.

Dictionary Examples:

```
[78] d = {} # Empty Dictionary
     e = dict() # Empty dictionary
     f = {'A': 10, 'B':20,'C':30}
     g = {100:'A', 200:'B', 300:'C'}
     # Dictionaries are suited for creating data records
     h = {'Rollno': 1001,'Name': 'Ravi', 'Marks':[10,20,30]}
     # Dictionay key-value pairs can be represented as tuples
     i = dict([('A',10),('B',20),('C',30)])
     print(i)

     {'A': 10, 'B': 20, 'C': 30}
```

Dictionary Operations:

- **Displaying Values for a given Key**: We can use dictName[key] to get the value.

```
[79] f = {'A': 10, 'B':20,'C':30}
     print(f['B'])

     20
```

- **Adding a Key-Value pair to a dictionary**: We can add a key-value pair to a dictionary using the syntax dictName[key]=value. In case we are trying to add an existing key, then the latest value will replace the old value of the existing key without adding a new key-value pair.

```
[80] f = {'A': 10, 'B':20,'C':30}
     f['D']=100
     print(f)

     {'A': 10, 'B': 20, 'C': 30, 'D': 100}
```

```
[81] f = {'A': 10, 'B':20,'C':30}
     f['A']=100
     print(f)

     {'A': 100, 'B': 20, 'C': 30}
```

See here that the latest value is updated for the existing key A

- **Dictionary Methods**: Like Strings and lists, dictionaries too have global and member functions.
    - **Global functions**: The global functions include len(), max(), min(), sum() and

```
[87]  f = {'B': 10, 'D':20,'C':30}
      print(len(f))# returns the numbr of key-value pairs
      print(max(f))# returns the maximum ASCII valued Key
      print(min(f))# returns the minimum ASCII valued Key
      print(sorted(f))# returns a list with keys in sorted order
      print(sorted(f, reverse=True))# returns a list with keys in reverse sorted order
```

```
3
D
B
['B', 'C', 'D']
['D', 'C', 'B']
```

sorted()

    - **Dictionary Member Methods**: These methods are called using the syntax dictName.methodName()
      clear() – Removes all the elements from the dictionary and makes it empty.
      copy() – Creates a copy of the existing dictionary.
      get(key) – Returns the value for a given key.

```
[88] f = {'A': 10, 'B':20,'C':30}
     print(f.get('B'))
```

```
20
```

keys() – Returns a view object containing the keys of the dictionary, that can be converted to list using a list() method.

```
[89] f = {'A': 10, 'B':20,'C':30}
     print(f.keys())
```

```
dict_keys(['A', 'B', 'C'])
```

values() - Returns a view object containing the values of the dictionary, that can be converted to list using a list() method.

```
[90] f = {'A': 10, 'B':20,'C':30}
     print(f.values())
```

```
dict_values([10, 20, 30])
```

items() - Returns a view object containing the key-value pairs as tuples of the dictionary, that can be converted to list of tuples using a list() method.

```
[91] f = {'A': 10, 'B':20,'C':30}
     print(f.items())
```

```
dict_items([('A', 10), ('B', 20), ('C', 30)])
```

update() – Used to add the contents of one dictionary as key-value pairs in another dictionary.

```
[92]  f = {'A': 10, 'B':20,'C':30}
      f.update({'D':40, 'E':50})
      print(f)
```

```
{'A': 10, 'B': 20, 'C': 30, 'D': 40, 'E': 50}
```

pop(key) – Removes a key-value pair from a dictionary and returns only the value.

```
[93] f = {'A': 10, 'B':20,'C':30}
     x = f.pop('B')
     print(x, f)
```

```
20 {'A': 10, 'C': 30}
```

popitem() – Reoves the last added key-value pair from the dictionary and returns a tuple containing the removed key-value pair.

```
[94] f = {'A': 10, 'B':20,'C':30}
     x = f.popitem()
     print(x)
```

```
('C', 30)
```

fromkeys(key-seq, value) – Returns a dictionary containing the keys as the element of the sequence(list, tuple) and a single optional value.

```
key = ['A','B','C']
val = 20
d = dict.fromkeys(key, val)
print(d)
```

```
{'A': 20, 'B': 20, 'C': 20}
```

setdefault(key, value) – Returns the value for the key if the key is in the dictionary, else adds the key-value pair to the dictionary.

```
f = {'A': 10, 'B':20,'C':30}
f.setdefault('D', 40) # Adds a new key value pair
print(f)
print(f.setdefault('A',50)) # returns the value for the existing key
```

```
{'A': 10, 'B': 20, 'C': 30, 'D': 40}
10
```

Questions:

Q.1	Which of the following statements is False for a python dictionary? a) Dictionary Keys can be created using another dictionary. b) Dictionary values can be a dictionary. c) Dictionary Values are mutable. d) dict() function can be used to create a dictionary.
Q.2	What will be the output of the following program? d={'A':10,'B':20,'C':30,'D':40} del d['C'] print(d) x = d.popitem() print(x)
	Questions 3 is an ASSERTION AND REASONING based Questions. Mark the correct choice as: i) Both A and R are true, and R is the correct explanation for A ii) Both A and R are true, and R is not the correct explanation for A iii) A is True but R is False iv) A is false but R is True
Q.3	ASSERTION: A python dictionary remains the same even if we interchange the position of key-value pairs. REASONING: Dictionaries are un-ordered collection of key-value pairs.
Q.4	What will be the output of the following? d = {"A":10, "B":20, "C":30, "A":40} print(d) a) {"A":10, "B":20, "C":30, "A":40} b) {"A":40, "B":20, "C":30} c) {"A":50, "B":20, "C":30} d) KeyError
Q.5	Sapna wants to understand the concept of methods in a dictionary. Help her to find the answers of the following operations on a python dictionary: d = {'M':10, 'N':20, 'O':30, 'P':40} r = d.popitem() print(r) x = d.pop('N') print(x) print(list(d.keys())) d.setdefault('X',60) print(d)
Q.6	Write a python program that increases the values by 10 for the dictionary alphabets as keys and numbers as values where ever the key is a vowel.

Python Tuples

- Python tuples are a collection of objects enclosed in ().
- Python tuples are immutable.
- Python tuples are ordered.
- Python tuples are indexed like lists and strings.
- Python tuples may contain heterogenous elements.
- Python tuples can be nested.

Tuple examples:

```
t = () # empty tuple
u = tuple() # empty tuple
m = 10, # tuple may not have ()
n = (10,20)
x = ((10,20,30),(40,50,60)) # Nested tuples
```

Tuple operations: Like string and lists tuples too have concatenations, replication, indexing, slicing and iteration operation. We are not going to discuss them here since you can follow the list and strings to learn and practice them.

Tuple methods: Tuples have a few global methods and only two member methods.

- Global Methods – tuple(), min(), max(), len(), sum() and sorted(). We shall discuss here only the sorted() method.

```
[98] t = (10,5,8,7,3)
     x = sorted(t)
     y =sorted(t, reverse = True)
     print(x)
     print(y)

     [3, 5, 7, 8, 10]
     [10, 8, 7, 5, 3]
```

- Tuple member methods:
  index(element) – Like lists tuple too returns the index of the first occurrence of the element.
  count(element) – Counts the occurrences of an element from a tuple as we have learned in lists.

Python Functions

Python Function:- Functions is a block of code that is identified by its name. A function can be executed by calling it. Writing the name of the function will call a function. Functions are internally declared in a separate memory area. So a function can declare variables with the same as declared in the outer part of the program.

Type of function :- Build in function (all functions defined by python min() max() , lent() etc, User-defined functions (defined by the user)

Advantage of function :- (i) Reduces the size of the program (ii) improves reusability of code

def keyword:- def keyword declares a user defined function followed by parameters and terminated with a colon.

return keyword :- whenever the return keyword is executed inside a function it returns the control back to its caller along with some value if passed explicitly. Writing return is not compulsory and we can write as many return keywords as needed but only one return keyword is executed.

Actual parameters :- When we call a function and pass some values to the function. These passed values are called actual parameters.

Formal parameters :- The parameters declared in the header part of the function is called formal parameters or the values received by the functions from its caller is called formal parameters.

Default parameters:- It is formal parameters with the assignment of values. These values are used if the caller does not provide value to that parameter. **Remember default parameters are written after not default parameters.**

def << name of the >> (formal parameters) : function body is always writer in tab indentation

code hare

code here

out of scope of function. The function call can be placed after this part.

Example :-

```
def myfunction(a,b,c=10) :    a,b and c is formal parameter and c is with default values
    print(a,b,c)
    return (a+b+c)
total = myfunction(10,20,30)  # 10 12 and 30 are actual parameter.
```

Q. Write a function findbig that take 2 integers as parameters and returns the largest value.

```
def findbig(a,b):
    if a>b:
        return a
    else:
        return b
x,y=5,10
bigvalue=findbig(x,y)
```

Practice questions:

(i)
```
def fun2(name,age):
    print(age,name)
func2(25,"Ramesh")
```
Ans :- Ramesh, 25

(ii)
```
def fun3(a,b,c):
    return a+1,b+2,c+3     #if more than 1 values are returned than it will be as tuple
t=fun3(10,20,30)
print(t)
```
Ans:- (11,12,33)

(iii)
```
def fun2(list1):
    for x in list1:
        print(x.upper(),end="#")
fun2(['Rajesh','Kumar'])
```
Ans:- RAJESH # KUMAR

(iv)
```
def fun2(num1,num2):
    for x in range(num1,num2):if
        x%4==0:
            print(x,end=' ')
fun2(10,20)
```
Ans:- 10 12 16 18

(v)
```
def prog(email):
    for x in email.split("."):
        if x.isalpha():
            print("alphabet")
        elif x.isdigit():
            print("digit")
        elif  x.isupper():
            print("upper")
        else:
            print("all the best")
prog("rajesh.123.yahoo")
```

Ans :-
```
AlphabetDigit
Alphabet
```

(vi)
```
def check(x,y):
    if x != y:
        return x+5
    else:
        return y+10
    print(check(10,5))
```
Ans :- 15

TEXT FILE HANDLING

Key points:

Data 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 files 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 a binary file using a text editor.

CSV file: CSV (Comma Separated Values) is a file format for data storage which looks like a text file. The information is organized with one record on each line and each field is separated by comma

Aspect	Text File	Binary File	CSV File (Comma-Separated Values)
Format	Contains plain text	Contains binary data	Stores tabular data in plain text
Content	Human-readable	Not human-readable	Human-readable
Character Encoding	ASCII, UTF-8	Not applicable	ASCII, UTF-8
Structure	Data is stored as lines of text	Data is stored as sequences of binary bytes	Data is organized into rows and columns
Usage	Suitable for storing textual data	Suitable for storing non-textual data	Ideal for storing structured tabular data
Example File Extensions	.txt	.jpg, .mp3, .exe	.csv

1. Opening a Text File

- Use the open() function to open a text file.
- Syntax: file_object = open("filename.txt", mode)
- Replace "filename.txt" with the name of the text file and mode with the desired file open mode.

2. Text File Modes

- 'r': Read mode. Opens a file for reading only. Raises an error if the file does not exist.
- 'r+': Read and Write mode. Opens a file for both reading and writing.
- 'w': Write mode. Opens a file for writing only. Creates a new file if it does not exist. Truncates the file if it exists.
- 'w+': Write and Read mode. Opens a file for reading and writing. Creates a new file if it does not exist. Truncates the file if it exists.
- 'a': Append mode. Opens a file for appending data. Creates a new file if it does not exist.
- 'a+': Append and Read mode. Opens a file for appending data and reading. Creates a new file if it does not exist.

3. Closing a Text File

- Always close a file after operations to release system resources.
- Use the close() method on the file object: file_object.close().

4. Opening a File Using with Clause

The with statement ensures that the file is properly closed after its suite finishes executing.

Syntax:

```
with open("filename.txt", mode) as file_object:
    # Perform file operations
```

5. Writing/Appending Data to a Text File

- Use the write() method to write data to a file.
  The write() function will write the content in the file without adding any extra characters.
  file_name.write(content)
- Use the writelines() method to write a sequence of lines to a file.
  file_name.writelines(sequence_of_lines)
- If the file is opened in write mode ('w' or 'w+'), it will overwrite existing content.
- If the file is opened in append mode ('a' or 'a+'), new data will be added to the end of the file.

6. Reading from a Text File

- Use the read() method to read the entire contents of a file as a single string if value of n is not given else it will read n characters from the current position.
  File_object.read([n])
- Use the readline() method to read a single line from the file.
  File_object.readlines()
  Note: '\n' is treated as a special character of two bytes.
- Use the readlines() method to read all lines from the file into a list.

7. seek() and tell() Methods

seek() 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.

tell() method returns the current file position. 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:

file_object.tell()

Questions:

S.No.	1 Mark Questions	Answers
1.	What is the extension of regular text files? a).txt b).dat c).ppt d) .doc	A
2.	Which files can be opened in human readable form? a) binary files b) text files c) Both a and b d)None	B
3.	What is the default mode in which text file is opened? a)write b)read c)append d)None	B
4.	Which statement is correct for opening the file? a) f=open(“c:\\data.txt”,”r”) b)f=open(r”c:\data.txt”,”r”) c)Both a and b d)None	C
5.	Which of the following mode cannot be used for opening the text file? a)’r’ b)’w+’ c)’a’ d)’rb+’	D
6.	Which is correct way of closing the text file? a)f.close() b)close(f) c) Both a and b d)None	A
7.	Which statement is correct to read n bytes from text file using f as file object? a)f.read(n) b)f.readline(n) c)Both a and b d)None	A
8.	Which of the following function is used to read all the lines of the text file? a)readline() b)read() c)readlines() d)readit()	C
9.	What is the return datatype of read () function? a)string b)List c)Tuple d)Dictionary	A
10.	What is the return datatype of readlines() function? a)string b)List c)Tuple d)Dictionary	B
11.	Which function is used to write group of characters on to the text file?	B

	a)writegroup() b)write() c)writechar() d)writeall()	
12.	Which function is used to write List of strings on to the text file? a)writelist() b)writeline() c)writelines() d)writeall()	C
13.	In which mode text file should be opened to add the data at the end to the text file? a)'r' b)'w' c)'a' d)'b'	C
14.	Which of the following command can be used to open the text file in writing as well as reading mode? a)f=open("c:\data.txt",'r') b)f=open("c:\data.txt",'w+') c)f=open(c:\\data.txt",'w+) d) f=open("c:\\data.txt",'w')	C
15.	hich of the following statements is true regarding the opening modes of a file? a) While opening a file for reading, if the file does not exist, an error occurs. b) While opening a file for writing ,if the file does not exist, an error occurs. c) While opening a file for reading, if the file does not exist, a new file is created. d) None of the above.	A
16.	State True or False "csv files are special text files"	True
17.	State True or False "text files are slower in processing as they requires translation of special characters"	True
18.	Assertion(A): File opened in' w' mode always places the cursor at the beginning of the file and never generates an error. Reason(R): 'w' mode creates the file even if the file doesn't exist. a)Both A and R are true and R is the correct explanation of A. b)Both A and R are true but R is not the correct explanation of A. c)A is true but R is false. d)R is true but A is false.	A
19.	Assertion(A):Text file contains data in human readable form. Reason(R): It executes faster than any other type of the file. a)Both A and R are true and R is the correct explanation of A. b)Both A and R are true but R is not the correct explanation of A. c)A is true but R is false. d)R is true but A is false.	C
20.	Assertion(A): read()and readline() are used to read the data from the text file. Reasoning(R): readlines() function is used to read all lines from the file in the form of a List. a)Both A and R are true and R is the correct explanation of A. b)Both A and R are true but R is not the correct explanation of A. c)A is true but R is false. d)R is true but A is false.	B

	2 Mark questions	

1.
Ans
	What is the difference between read() and readline() function of text files?
	The read() function read specified number of n bytes. If n is not specified, read the entire file.
	e.g. s=f.read(10) #read 10 bytes
	s= f.read() # read the entire file
	
	The readline() function read a single line. If n is specified , read n bytes from the file.
	e.g. p=f.readline() # read single line
	p=f.readline(7) # read 7 bytes from the file	

2.
Ans
	What is the difference between readlines() and readline() function used with the text file?
	The function readlines() read all the lines of the text file and store them as elements of the List.
	e.g. s= f.readlines() # all lines of text file will be read and store in list s
	
	The function readline() will read a single line from the text file and if n is specified as the argument, read n bytes from the file.
	e.g. p=f.readline() # read single line
	p=f.readline(7) # read 7 bytes from the file	

3. Ans	Name the functions used to write data on the text files. Explain The two functions write() and writelines() are used to write data on the text files. a)write()- This function writes a group of characters on to the text file. e.g. s="Computer Science" f.write(s) # It will write string s to the file using file object f b) writelines()- This function write strings in List as Lines to the file. e.g. f.writelines(L) # It will write strings in List L as lines in the file using file pointer f.	
4. Ans	What is the difference between 'w' and 'a' mode used while opening a text file? When 'w' mode is used while opening the text file , it opens the file in write mode and places the cursor at the beginning of the file and truncates the data of the file. And if file doesn't exist ,it creates the file. Whereas when 'a' mode is used while opening the file, it opens the file in append mode and places the cursor at the end of the file for adding the data at the end. Here also file is created , if file doesn't exist.	
5. Ans	What is the difference between 'r+' mode and 'w+' mode used while opening the text file? With both the modes reading and writing operations can take place, but difference is that if file is opened using 'w+' mode, file is created if file doesn't exist, whereas if file is opened using 'r+' mode, error is raised if file doesn't exist.	
6.	If the focus.txt file contains the following text: ***Mindfulness, cognitive training, and a healthy lifestyle may help sharpen your focus.*** Find the output of the following code: F=open("focus.txt",'r') S=F.read(11) print(S) F.close()	

Ans	Mindfulness
7.	Find the output of the following code: F=open(“focus.txt”,’r’) S= F.readline() print(S) T=F.readline() print(T) F.close()
Ans	Mindfulness, cognitive training, and a healthy lifestyle may help sharpen your focus
8.	Find the output of the following code: F=open(“focus.txt”,’r’) L= F.readlines() for a in L: print(a.upper()) F.close()
Ans	MINDFULNESS, COGNITIVE TRAINING, AND A HEALTHY LIFESTYLE MAY HELP SHARPEN YOUR FOCUS

9.	Find the output of the following code:
	
	F=open(“focus.txt”,’a+’)
	S= “ sleep reduces stress hormones that can be harmful to the brain”
	F.write(S)
	F.seek(0) # bring cursor to the beginning of the file
	L=F.readlines()
	print(L)
	F.close()

Ans	['Mindfulness, cognitive training, and a healthy lifestyle may help\n', 'sharpen your focus sleep reduces stress hormones that can be harmful to the brain']
10.	Find the output of the following code: F=open(“wish.txt”, ’w’) F.write(“Day”) F.close() If the file contains “Good” before execution, what will be the contents of the file after execution of the above code.
Ans	After execution, file will contain “Day” only as previous data will be truncated by write operation over the file.

	3 Marks questions
1.	Write a program to read text file story.txt and count number of lines starting with letter ‘A’ or ‘a’.

Ans	F=open("story.txt",'r')
	count=0
	L=F.readlines()
	for i in L:
	  if i[0]=='A' or i[0]=='a':
	  count=count+1
	print("no. of lines starting with a=",count)
	F.close()

2.	Write a program to read the file data.txt and count number of uppercase, lowercase in it.

Ans	F=open("data.txt",'r')
	u=0
	l=0
	s=F.read()
	for i in s:
	  if i.isupper():
	  u=u+1
	  if i.islower():
	  l=l+1
	print("Number of uppercase characters=",u)
	print("Number of lowercase characters=",l)
	F.close()

3.	Write a program to read the file data.txt and count number of spaces in it.

Ans	F=open("data.txt",'r')
	space=0
	s=F.read()
	for i in s:
	  if i.isspace():
	  space=space+1
	 print("Number of spaces=",space)
	F.close()

4.	Write a program to read the file hash.txt and display the number characters up to first #.

Ans	F=open("hash.txt",'r')
	count=0
	s=F.read()
	for i in s:
	  if i!='#':
	  count=count+1
	  else:
	  break
	print("Number of characters up till # =",count)
	F.close()

5.	Write a program to read the file alphabet.txt and display all the lines in uppercase.

Ans	F=open("alphabet.txt",'r') L=F.readlines() for i in L: print(i.upper()) F.close()
6. Ans	Write a program to read the file data.txt and count number of lines present in it. F=open("data.txt",'r') L=F.readlines() print("Number of lines in the file=",len(L)) F.close()

7.
 	
Ans
	Write a program to read the file data.txt and display only the digits present in it.
	
	F=open("data.txt",'r')
	s=F.read()
	for letter in s:
	  if letter.isdigit():
	  print(letter)
	F.close()

8. Ans	Write a program to read the file story.txt and display second last line of the file. F=open("story.txt",'r') L=F.readlines() print(L[-2]) F.close()

9.
 	
Ans
	Write a program to read the file article.txt and count occurrences of words “the” in the file.
	
	F=open("article.txt",'r')
	count=0
	s=F.read()
	L=s.split()
	for word in L:
	  if word=="the":
	  count=count+1
	print("No. of occurences of word the=",count)
	F.close()

10.
 	
Ans
	Write a program to read the file letter.txt and display those words which has less than or equal to four characters.
	
	F=open("story.txt",'r')
	s=F.read()
	L=s.split()
	for word in L:
	  if len(word)<=4:
	  print(word)
	F.close()

	4 Marks questions

1	Write python statements for opening the following files. Also, write the Python statements to open the following files: a) a text file “example.txt” in both read and write mode b) a text file “bfile.dat” in write mode c) a text file “try.txt” in append and read mode d) a text file “btry.dat” in read only mode.
Ans	(a) F = open(‘example.txt’,”r+”) (b) F = open(“bfile.dat” , “w”) (c) F = open(‘try.txt’ , “a”) (d) F = open(‘btry’ , ’r’)
2 (i)	What is the difference between the following set of statements (a) and (b): a) P = open(“practice.txt”,”r”) P.read(10) b) with open(“practice.txt”, “r”) as P: x = P.read()
Ans	Set of statements (a) would read the file “practice.txt” and returns a string that contains first 10 characters of the text file. Set of statements (b) will read the text file “practice.txt” and returns a string that contains entire contents of the text file.
(ii)	Write a command(s) to write the following lines to the text file named hello.txt. Assume that the file is opened in append mode. “ Welcome my class” “It is a fun place” “You will learn and play”
Ans	F = open(“TFILE.txt”, ‘a’) L = [“ Welcome my class” , “It is a fun place” , “You will learn and play”] F.writelines(L) F.close()
3	Write a method/function COUNTLINES_ET() in python to read lines from a text file REPORT.TXT, and COUNT those lines which are starting either with ‘E’ and starting with ‘T’ respectively. Display the Total count separately.

Ans	def COUNTLINES_ET():
	f=open(“REPORT.TXT”)
	d=f.readlines()
	le=0
	lt=0
	for i in d:
	if i[0]==’E:
	le=le+1
	elif i[0]==’T’:
	lt=lt+1
	print(“no of line start with”,le)
	print(“no of line start with”,lt)

4	Write a function filter(oldfile, newfile) that copies all the lines of a text file “source.txt” onto “target.txt” except those lines which starts with “@” sign.
Ans	def filter(oldfile, newfile): f1 = open("oldfile","r")

	f2 = open("newfile","w")
	while True:
	text= f1.readline()
	if len(text) ==0:
	break
	if text[0] == '@':
	continue
	f2.write(text)
	f1.close()
	f2.close()

5 (i) Ans	Write a user defined function countwords() to display the total number of words present in the file from a text file "Quotes.Txt". def countwords(): s = open("Quotes.txt","r") f = s.read() z = f.split () print ("Total number of words:", len(z))

(ii)
 	
Ans
	Write a function COUNT_AND( ) in Python to read the text file "STORY.TXT" and count the number of times "AND" occurs in the file. (include AND/and/And in the counting)
	
	def COUNT_AND( ):
	count=0
	file=open('STORY.TXT','r')
	line = file.read()
	word = line.split()
	for w in word:
	if w.upper() =='AND':
	count=count+1
	print(count)
	file.close()

	5 Marks questions
1 (i) Ans	Differentiate between Text files and Binary files. **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 a binary file using a text editor.
(ii) Ans	Write a method COUNTWORDS() in Python to read data from text file 'ARTICLE.TXT' and display the count of words which ends with a vowel. For example, if the file content is as follows: An apple a day keeps you healthy and wise The COUNTWORDS() function should display the output as: Total words which ends with vowel = 4 def COUNTWORDS(): fil = open('ARTICLE.TXT' , 'r') data = fil.read()

```
        words = data.split()
        count = 0
        for w in words:
            if w[-1] in 'aeiouAEIOU':
                count += 1
        fil.close()
        print('Total words which ends with vowel =',count)
```

2 (i) Ans

Explain seek() and tell() methods.

seek() 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])
For example, the statement fileObject.seek(5,0) will position the file object at 5th byte position from the beginning of the file.
tell() method returns the current file position. 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:
file_object.tell()

(ii)

Write a function COUNT() in Python to read from a text file 'rhym.txt' and display the count of words in each line.
Example: If the content of 'rhym.txt' is as follows:
Jack and jill
Went up the hill
To enjoy
Then the COUNT() function should display output as:
Line 1 : 3
Line 2 : 4
Line 3 : 2

Ans

```
def COUNT():
    fil = open('rhym.txt')
    lines = fil.readlines()
    c = 1
    for l in lines:
        words = l.split()
        print('Line',c,':',len(words))
        c = c+1
    fil.close()
```

3 (i) Ans

Differentiate between w+ and a+ file modes.

Parameter	w+ Mode	a+ Mode
Description	Opens a file for reading and writing (truncate file).	Opens a file for reading and appending (creates file if not exists).
File Pointer	Points at the beginning of the file after opening.	Points at the end of the file after opening.
Write Operation	Overwrites existing content with new data.	Appends new data to the end of the file.
Read Operation	Reads from the beginning of the file.	Reads from the beginning of the file.
File Truncation	Truncates the file to zero length if it exists.	Does not truncate the file; preserves existing content.

	Creation	Creates a new file if it does not exist.	Creates a new file if it does not exist.
	Usage	Useful for scenarios where existing content needs to be overwritten or a new file needs to be created.	Useful for scenarios where data needs to be appended to an existing file without losing the existing content.

(ii) Write a function WE_WORDS() in Python to read from a text file 'TEXT.TXT' and display the count of words which starts with 'WE'.
Example: If the content of 'TEXT.TXT' is as follows:
WE MUST WELCOME ALL WEATHER FROM WEST
Then the WE_WORDS() function should display output as:
TOTAL WORDS STARTING WITH WE = 4

Ans

```
def WE_COUNT():
    fil = open('TEXT.TXT')
    data = fil.read()
    words = data.split()
    count = 0
    for w in words:
        if w.startswith('WE'):
            count = count + 1
    print('TOTAL WORDS STARTING WITH WE=',count)
    fil.close()
```

4 (i) What will be the return datatype of the following methods:
read()
readlines()

Ans
read() – String
readlines() – List

(ii) A pre-existing text file data.txt has some words written in it. Write a python function displaywords() that will print all the words that are having length greater than 3.
Example:
For the fie content:
A man always wants to strive higher in his life He wants to be perfect.
The output after executing displayword() will be: Always wants strive higher life wants perfect

Ans

```
def displaywords():
        f = open('data.txt','r')
        s = f.read()
        lst = s.split() for x in lst:
        if len(x)>3:
                print(x, end=" ")
        f.close()
```

5 (i) Explain the use of seek() method.

Ans **seek() 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.

(ii)
 	
Ans
	A pre-existing text file info.txt has some text written in it. Write a python function countvowel() that reads the contents of the file and counts the occurrence of vowels(A,E,I,O,U) in the file.
	
	def countvowels():
	f = open('info.txt', 'r')
	s = f.read()
	count = 0
	for x in s:
	if x in 'AEIOU':
	count+=1
	print(count) f.close()

BINARY FILE HANDLING IN PYTHON

Binary files store data in the binary format (that is, in the form of 0's and 1's) which is understandable by the machine. So when we open the binary file in our machine, it decodes the data and displays it in a human-readable format. It is important to note that the binary file contents can be displayed correctly using only specialized applications that can read binary data. If we open any binary file using a normal text editor like a notepad, we may see strange characters.

Examples of binary files include files stored with the extension of .dat, .doc, .docx, .mp4, etc. As you may relate now, these files can be opened correctly using specific applications only, that are different for each file extension. Try opening any of these binary files using notepad, and observe the magic (file opens but with unreadable contents). In this chapter of binary file handling, we'll learn to create such files (in their simple forms), modify its contents and display its contents properly.

Binary File Modes:

File mode governs the type of operations (read/write/append) that is possible in the opened file. It refers to how the file will be used once it's opened.

File Mode Description:

rb: Read Only: Opens existing file for read operation

wb: Write Only: Opens file for write operation. If the file does not exist, the file is created. If a file exists, it overwrites data.

ab: Append: Opens file in write mode. If a file exists, data will be appended at the end.

rb+: Read and Write: File should exist, Both read and write operations can be performed.

wb+: Write and Read: File created if it does not exist, If file exists, file is truncated.

ab+: Write and Read: File created if does not exist, If file exists data is truncated.

Writing data to a Binary File:

Pickle is a special python package (module) that is used to generate data in binary format. Pickle comes with few methods like load() and dump( ) to read and write data in binary format.

Pickle Module: Python Pickle is used to serialize and deserialize a python object structure. Any object on python can be pickled so that it can be saved on disk.

Pickling: Pickling is the process whereby a Python object hierarchy is converted into a byte stream.

Unpickling: A byte stream is converted into object hierarchy.

To use the picking methods in a program, we have to import the pickle module using import keyword.

Example:

import pickle #don’t write pickel

In this module, we shall discuss two of its useful functions, which are:

i. dump( ) : To store/write the object data to the file.

ii. load( ) : To read the object data from a file and return the object data.

Syntax:

Write the object to the file:

pickle.dump(List_name, file-object) #To write a list object into a binary file

Read the object from a file:

pickle.load(file-object)

Example:

```
import pickle
list =[ ] # empty list
while True:
        roll = input("Enter student Roll No:")
        sname = input("Enter student Name :")
        student = {"roll":roll,"name":sname} # create a dictionary
        list.append(student) # add dictionary as element in list
        choice= input("Want to add more record(y/n) :")
        if(choice=='n'):
                break
file = open("student.dat","wb")#open file in binary & write mode
pickle.dump(list, file) #imp: first data, then file handle
file.close( )
```

OUTPUT:

```
Enter student Roll No:1201
Enter student Name :Anil
Want to add more record(y/n) :y
Enter student Roll No:1202
Enter student Name :Sunil
Want to add more record(y/n) :n
```

Read data from a Binary File:

To read the data from a binary file, we have to use the load( ) function of the pickle module.

Example:

```
import pickle
file = open("student.dat", "rb")
list = pickle.load(file)
print(list)
file.close( )
```

OUTPUT:

[{'roll': '1201', 'name': 'Anil'}, {'roll': '1202', 'name': 'Sunil'}]

To update a record in Binary File:

Locate the record to be updated by searching for it. Make changes in the loaded record in memory. Write back onto the file at the exact location of the record.

```
import pickle
roll = input('Enter roll number whose name you want to update in binary file :')
file = open("student.dat", "rb+")
list = pickle.load(file)
found = 0
lst = [ ]
for x in list:
        if roll in x['roll']:
                found = 1
        x['name'] = input('Enter new name: ')
        lst.append(x)
        if found == 1:
                file.seek(0)
        pickle.dump(lst, file)
        print("Record Updated")
else:
        print('roll number does not exist')
file.close( )
```

OUTPUT:

Enter roll number whose name you want to update in binary file :1202

Enter new name: Harish

Record Updated

Deleting a record from binary file:

```
import pickle
roll = input('Enter roll number whose record you want to delete:')
file = open("student.dat", "rb+")
list = pickle.load(file)
found = 0
lst = []
for x in list:
        if roll not in x['roll']:
            lst.append(x)
        else:
            found = 1
        if found == 1:
            file.seek(0)
            pickle.dump(lst, file)
        print("Record Deleted ")
else:
        print('Roll Number does not exist')
file.close( )
```

OUTPUT:

Enter roll number whose record you want to delete:1201

Record Deleted

Searching a record in a binary file:

```
import pickle
roll = input('Enter roll number that you want to search in binary file :')
file = open("student.dat", "rb")
list = pickle.load(file)
file.close( )
for x in list:
        if roll in x['roll']:
            print("Name of student is:", x['name'])
            break
        else:
            print("Record not found")
```

OUTPUT:

Enter roll number that you want to search in binary file :1202

Name of student is: Harish

tell( ) and seek( ) methods:

tell( ): It returns the current position of cursor in file.

Example:

```
fout=open("story.txt","w")
fout.write("Welcome Python")
print(fout.tell( ))
fout.close( )
```

Output:

15

seek(offset, reference_point): Change the cursor position by bytes as specified by the offset, from the reference point.

Example:

```
fout=open("story.txt","w")
fout.write("Welcome Python")
fout.seek(5)
print(fout.tell( ))
fout.close( )
```

Output:

5

1 Mark Questions

1. The process of converting byte stream back to the original structure is known as

a. Picklingb. b. Unpickling c. Packing d. Zipping

2. Which file mode is used to handle binary file for reading.

a. rb b. rw c. r d. w

3. Which of the following is not a correct statement for binary files?

a. Easy for carrying data into buffer b. Much faster than other file systems

c. Characters translation is not required d. Every line ends with new line character '\n'

4. Which one of the following is correct statement?

a. import – pickle b. pickle import c. import pickle d. All the above

5. Which of the following file mode opens a file for append or read a binary file and moves the files pointer at the end of the file if the file already exist otherwise create a new file?

a. a b. ab c. ab+ d. a+

6. Which of the following file mode opens a file for reading and writing both as well as overwrite the existing file if the file exists otherwise creates a new file?

a. w b. wb+ c. wb d. rwb

7. Mr Sharma 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 sharma_list.dat, and file object as f. Which of the following can be the correct statement for him?

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)

8. Every file has its own identity associated with it. This is known as:

a. icon b. extension c. format d. file type

9. EOL in a file stands for :

a. End of Lines b. End of Line c. End of List d. End of Location

10. Which of the following file types allows you to store large data files in the computer memory?

a. Binary Files b. Text Files c. CSV Files d. None of these

2 Marks Questions

1. Write a program in python to write and read structure, dictionary to the binary file.

2. BINARY file is unreadable and open and close through a function only so what are the advantages of using binary file

3. Write a statement to open a binary file name sample.dat in read mode and the file sample.dat is placed in a folder (name school) existing in c drive.

4. When do you think text files should be preferred over binary files?

5. Consider a binary file employee.dat containing details such as empno:ename:salary (separator ':') write a python function to display details of those employees who are earning between 20000 and 30000(both values inclusive)

6. Differentiate between pickle.load() and pickle.dump() methods with suitable examples.

7. A binary file “Book.dat” has structure [BookNo, Book_Name, Author, Price].Write a user defined function CreateFile() to input data for a record and add to Book.dat

8. 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.

9. A binary file “Store.dat” has structure [ItemNo, Item_Name, Company, Price]. Write a function CountRec(Company) in Python which accepts the Company name as parameter and count and return number of Items by the given Company are stored in the binary file “Store.dat”.

10. A binary file “Store.dat” has structure [ItemNo, Item_Name, Company, Price]. Write a function AddRecord() which accepts a List of the record [ItemNo, Item_Name, Company, Price] and appends in the binary file “Store.Dat”.

3 Marks Questions

1. A binary file “Book.dat” has structure [BookNo, Book_Name, Author, Price].

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

ii. Write a function CountRec(Author) in Python which accepts the Author name as parameter and count and return number of books by the given Author are stored in the binary file “Book.dat”

2. A binary file “SCHOOL.DAT” has structure [Roll_Num, Name, Percentage]

i) Write a function Count_Rec() in Python that would read contents of the file “SCHOOL.DAT” and display the details of those students whose percentage is below 33.

ii) Write a function Disp_Rec(alphabet) in Python that would read contents of the file “SCHOOL.DAT” and display the details of those students whose name begins with the alphabet as passed as parameter to the function.

3. A binary file “STOCK.DAT” has structure [ITEMID, ITEMNAME, QUANTITY, PRICE]. Write a user defined function MakeFile( )to input data for a record and add to Book.dat.

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

5. 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.

6. A binary file “EMPLOYEE.DAT” has structure (EMPID, EMPNAME, SALARY). Write a function to display number of employees having Salary more than 20000.

7. A binary file named “EMP.dat” has some records of the structure [EmpNo, EName, Post, Salary], Write a user-defined function named NewEmp() to input the details of a new employee from the user and store it in EMP.dat.

8. Write a user-defined function named SumSalary(Post) that will accept an argument the post of employees & read the contents of EMP.dat and calculate the SUM of salary of all employees of that Post.

9. A binary file named “TEST.dat” has some records of the structure [TestId, Subject, MaxMarks, ScoredMarks] Write a function in Python named DisplayAvgMarks(Sub) that will accept a subject as an argument and read the contents of TEST.dat.

10. Write a python program to search and display the record of the student from a binary file “Student.dat” containing students records (Rollno, Name and Marks). Roll number of the student to be searched will be entered by the user.

5 Marks Questions

1. A binary file “student.dat” has structure [rollno, name, marks].

i. Write a user defined function insertRec() to input data for a student and add to student.dat.

ii. Write a function searchRollNo(r) in Python which accepts the student’s rollno as parameter and searches the record in the file “student.dat” and shows the details of student i.e. rollno, name and marks (if found) otherwise shows the message as ‘No record found’.

2. Write a python program to create binary file dvd.dat and write 10 records in it:

Dvd id,dvd name,qty,price

Display those dvd details whose dvd price is more than 25.

CSV FILES

A CSV (Comma-Separated Values) file is a plain text file format used to store tabular data, where each line represents a row, and each value within a row is separated by a comma or other delimiter.

A CSV file (Comma Separated Values file) is a type of plain text file that uses specific structuring to arrange tabular data.,

CSV File operations in Python Files in the CSV format can be imported to and exported from programs that store data in tables, such as Microsoft Excel or OpenOffice Calc. •

WHY USE CSV?

• The extensive use of social networking sites and their various associated applications requires the handling of huge data.

But the problem arises as to how to handle and organize this large unstructured data?

• The solution to the above problem is CSV.

Thus, CSV organizes data into a structured form and, hence, the proper and systematic organization of this large amount of data is done by CSV.

Since CSV file formats are of plain text format, it makes it very easy for website developers to create applications that implement CSV.

• The several advantages that are offered by CSV files are as follows:

– CSV is faster to handle.

– CSV is smaller in size.

– CSV is easy to generate and import onto a spreadsheet or database.

– CSV Is human readable and easy to edit manually.

– CSV is simple to implement and parse.

– CSV is processed by almost all existing applications CSV stands for “comma separated values”.

Each line in a file is known as data/record. Each record consists of one or more fields, separated by commas (also known as delimiters), i.e., each of the records is also a part of this file. Tabular data is stored as text in a CSV file. The use of comma as a field separator is the source of the name for this file format. It stores our data into a spreadsheet or a database.

CSV File operations in Python

• For working with CSV files in Python, there is an inbuilt module called CSV.

It is used to read and write tabular data in CSV format.

• To perform read and write operations with CSV file, we must **import CSV module.**

CSV module can handle CSV files correctly regardless of the operating system on which the files were created.

• Along with this module, open() function is used to open a CSV file and return file object. We load the module in the usual way using import:–

1)import csv

• Like other files (text and binary) in Python, there are two basic operations that can be carried out on a CSV file:

– 1. Reading from a CSV file

– 2. Writing to a CSV file

2) Opening and closing of CSV File

```
# Open the CSV file in write mode
file = open('data.csv', 'w', newline='')
# Perform operations on the file, such as writing data
file.write("Name, Age, City\n")
file.write("Alice, 25, New York\n")
file.write("Bob, 30, San Francisco\n")

# Close the file to free up system resources
file.close()
```

•Reading from a CSV File

- Reading from a CSV file is done using the reader object.

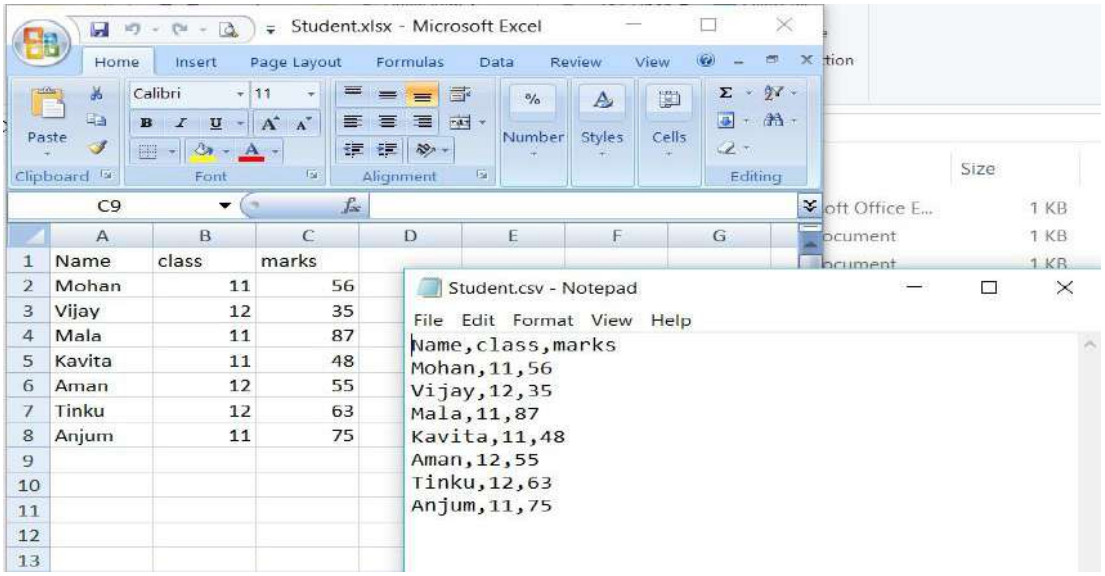
The CSV file is opened as a text file with Python's built-in open()function, which returns a file object.

This creates a special type of object to access the CSV file (reader object), using the reader() function.

•The reader object is an iterable that gives us access to each line of the CSV file as a list of fields. We can also use next() directly on it to read the next line of the CSV file, or we can treat it like a list in a for loop to read all the lines of the file (as lists of the

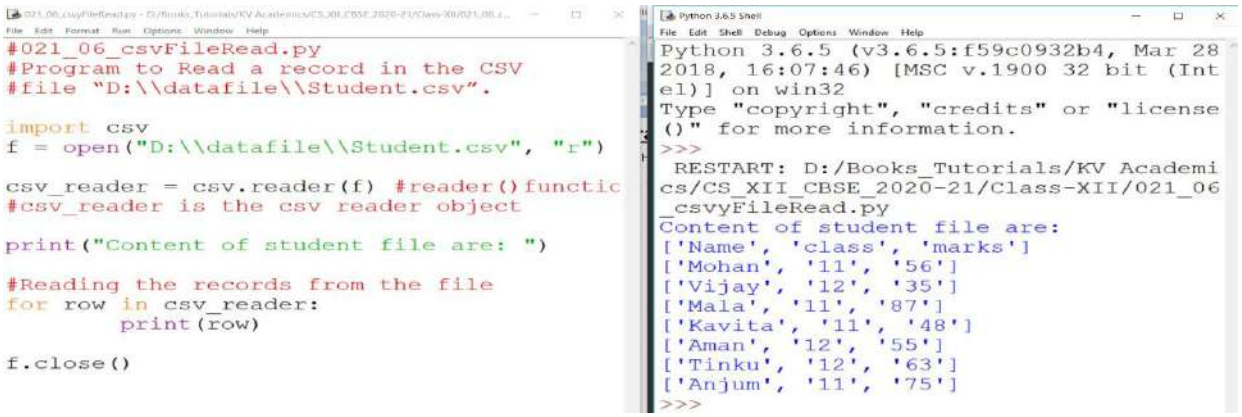
file's fields).

- Let us enter the student details in spreadsheet and save this file as shown.
- Next step is to open the Notepad and enter the data for student.csv, which will be the equivalent for



student.xls.

In student.csv (notepad) file, the first line is the header and remaining lines are the data/ records. The fields are separated by comma. In general, the separator character is called a delimiter, and the comma is



```
#021_06_csvFileRead.py
#Program to Read a record in the CSV
#file "D:\\datafile\\Student.csv".

import csv
f = open("D:\\datafile\\Student.csv", "r")

csv_reader = csv.reader(f) #reader()functic
#csv_reader is the csv reader object

print("Content of student file are: ")

#Reading the records from the file
for row in csv_reader:
        print(row)

f.close()
```

```
Python 3.6.5 (v3.6.5:f59c0932b4, Mar 28
2018, 16:07:46) [MSC v.1900 32 bit (Int
el)] on win32
Type "copyright", "credits" or "license
()" for more information.
>>>
 RESTART: D:/Books_Tutorials/KV Academi
cs/CS_XII_CBSE_2020-21/Class-XII/021_06
_csvyFileRead.py
Content of student file are:
['Name', 'class', 'marks']
['Mohan', '11', '56']
['Vijay', '12', '35']
['Mala', '11', '87']
['Kavita', '11', '48']
['Aman', '12', '55']
['Tinku', '12', '63']
['Anjum', '11', '75']
>>>
```

not the only one used. Other popular delimiters include the tab (\t), colon (:) and semi-colon (;) characters.

Program to read the contents of "student.csv" file

Every record is stored in reader object in the form of a List. We first open the CSV file in READ mode. The file object is named f. The file object is converted to csv.reader object. The reader object is used to read records as lists from a csv file. Iterate through all the rows using a for loop. row is nothing but a list containing all the field values

Writing to CSV FILE

STEPS:

1. import csv library.
2. Define a filename and Open the file using open().
3. Create a csvwriter object using csv.writer().
4. Write the header.
5. Write the rest of the data.

Writer Objects:

csvwriter.writerow(row)

Write the row parameter to the writer's file object

csvwriter.writerows(rows)

Example code to demonstrate use of writer objects:

```
import csv
# Data to be written to the CSV file
data_single_row = ['Name', 'Age', 'Grade']
data_multiple_rows = [ ['Alice', 20, 'A'],['Bob', 22, 'B']  ['Charlie', 21, 'C']]
```

```
# Writing data using writerow()
with open('students.csv', 'w', newline='') as file:
    writer = csv.writer(file)
    writer.writerow(data_single_row)                # Write a single row
    writer.writerow(['David', 23, 'B'])             # Write another single row
# Writing data using writerows()
with open('students.csv', 'a', newline='') as file:       # Use 'a' to append to the existing file
    writer = csv.writer(file)
    writer.writerows(data_multiple_rows)            # Write multiple rows at once
```

- We first define the data to be written to the CSV file as a list of lists (**data**).
- Using **writerow()**, we write each row of data to the CSV file one by one.
- Then, using **writerows()**, we append additional rows of data to the CSV file at once.

PRACTICE QUESTIONS

MCQ

1. Which Python module is used to work with CSV files?

A) csv

B) pandas

C) json

D) os

2. What is the purpose of the csv.writer() object in Python?

A) To read data from a CSV file

B) To write data into a CSV file

C) To perform mathematical operations

D) To create directories

3. To open a CSV file for writing, which mode should you use in the open() function?

A) 'r'

B) 'w'

C) 'a'

D) 'rb'

4. Which method is used to write a single row into a CSV file using the csv.writer() object?

A) write()

B) writerows()

C) writerow()

D) row()

5. How do you close a CSV file after you finish working with it in Python?

A) close_file()

B) close()

C) end()

D) stop()

6. Which method is used to write multiple rows into a CSV file using the csv.writer() object?

A) write()

B) writerows()

C) writerow()

D) row()

7. What parameter should be used in the open() function to ensure correct newline handling when working with CSV files?

A) newline='ignore'

B) newline=''

C) newline='skip'

D) newline=None

8. To read data from a CSV file in Python, which method of the csv.reader() object is used to iterate through each row?

A) readline()

B) next()

C) readrows()

D) for loop

9. What does the newline='' parameter in the open() function ensure when working with CSV files?

A) It skips writing empty lines.

B) It converts newlines to spaces.

C) It ensures universal newline support.

D) It prevents reading blank rows.

10. Which of the following is NOT a valid mode for opening a CSV file in Python?

A) 'r' (read mode)

B) 'w' (write mode)

C) 'a' (append mode)

D) 'x' (exclusive creation mode)

11. What type of data format is a CSV file?

A) Binary

B) Text-based

C) Image

D) Executable

12. Which method is used to read the entire contents of a CSV file into a list of lists using the csv.reader() object?

A) read()

B) readline()

C) next()

D) list()

13.When using the csv.writer() object, which method is used to write a list of data into a CSV file as a single row?

A) write()

B) writerow()

C) writeall()

D) row()

14,In Python's CSV module, which of the following is true about delimiter characters?

A) The delimiter character cannot be customized.

B) The delimiter character must always be a comma.

C) The delimiter character separates values within a CSV file.

D) The delimiter character is used for comments.

15. How does the csv.writerows() method differ from the csv.writerow() method?

A) writerows() writes a single row, while writerow() writes multiple rows.

B) writerows() writes multiple rows at once, while writerow() writes one row at a time.

C) writerows() converts data to CSV format, while writerow() writes data as-is.

D) writerows() automatically adds headers, while writerow() does not.

16.Which of the following is a benefit of using the csv module in Python for CSV file operations?

A) It requires less memory compared to other modules.

B) It automatically converts CSV files to Excel format.

C) It provides advanced data visualization features.

D) It supports various data formats other than CSV.

17.What does the newline='' parameter in the open() function prevent when writing to CSV files?

A) It prevents empty lines from being written.

B) It prevents writing data as binary.

C) It prevents newlines from being converted to spaces.

D) It prevents duplicate rows from being written.

18. When using the csv.reader() object to read from a CSV file, what type of data structure is each row of data represented as?

A) String

B) Dictionary

C) List

D) Tuple

19. How does the csv.DictReader() class differ from the csv.reader() class in Python?

A) DictReader() reads data as lists, while reader() reads data as dictionaries.

B) DictReader() reads data with column headers, while reader() does not.

C) DictReader() reads data as tuples, while reader() reads data as dictionaries.

D) DictReader() reads data as dictionaries, while reader() reads data as lists.

20. What is the purpose of using the newline='' parameter when opening a CSV file in Python?

A) To convert newlines to spaces.

B) To ensure cross-platform compatibility for newline characters.

C) To skip writing empty lines to the CSV file.

D) To automatically add headers to the CSV file.

2 marks questions

1. What is the purpose of using the csv module in Python?
2. Discuss the importance of newline handling when working with CSV files.
3. Differentiate between writerow() and writerows() methods in the csv.writer() object.
4. Describe the data format of a CSV file.
5. Explain the concept of a delimiter character in CSV files.
6. Write a Python code snippet to open a CSV file named "data.csv" in write mode and write a single row of data into it using the csv.writer() object.Include the necessary import statement and ensure proper closing of the file after writing.
7. Create a Python script that reads data from a CSV file named "input.csv" using the csv.reader() object and prints each row of data to the console.Handle any exceptions that may occur during file handling.
8. Write a Python program that generates a CSV file named "output.csv" and writes multiple rows of data into it using the csv.writer() object.The data can be generated randomly or from predefined lists.
9. Modify the previous code to append additional rows of data to the "output.csv" file using the csv.writer() object.
10. Implement a Python function that takes a CSV file path as input and returns the total number of rows in the CSV file using the csv.reader() object.

3 marks questions

1. write a Python program that performs the following tasks:
    - Opens a CSV file named "inventory.csv" in read mode using the **csv.reader()** object.
    - Iterates through each row in the CSV file.
    - Checks if the quantity (second column) of each item is less than 10. If so, appends the item's name (first column) to a list named **low_stock_items**.
    - Finally, prints the list **low_stock_items** containing the names of items with low stock.

2. Fill in the blanks in the following code snippet to open a CSV file named "sales.csv" in read mode using the **csv.reader()** object and calculate the total revenue by summing up the values in the third column (Price) of each row.

```
import csv
total_revenue = 0 with open('sales.csv', 'r') as file:
   reader = csv.reader(file) next(reader)    # Skip header row
 for row in reader:
     total_revenue += _______
     print('Total revenue:', total_revenue)
```

3. Given the CSV file "employees.csv":

```
Name,Department,Salary Alice,HR,50000 Bob,Engineering,60000 Charlie,Sales,45000
```

Identify and correct any errors in the following Python code snippet, then determine the output of the corrected code:

```
import csv
 total_salary = 0
with open('employees.csv', 'r') as file:
     reader = csv.reader(file)
              for row in reader:
              total_salary += row[2]
              print('Total salary:', total_salary)
```

4. Write a Python program that opens a CSV file named "students.csv" in write mode using the **csv.writer()** object. The program should prompt the user to enter student names and their respective grades, and then write this data into the CSV file. Ensure appropriate error handling for incorrect input.
5. Explain the concept of delimiter characters in CSV files and discuss their significance when working with the **csv** module in Python. Provide examples of different delimiter characters and explain how they affect the organization and interpretation of data within a CSV file.
6. Write a Python program that reads data from a CSV file named "data.csv" using the csv.reader() object. For each row, if the value in the second column (index 1) is greater than 50, write that row into a new CSV file named "high_scores.csv" using the csv.writer() object.
7. Fill in the blanks in the following code snippet to open a CSV file named "output.csv" in append mode and add a new row containing the student's name, age, and grade using the csv.writer() object.

```
import csv
student_data = ['Alice', 25, 'A']
with open('output.csv', 'a', newline='') as file:
   writer = csv.writer(_____)
```

```
    writer._____(student_data)
```

Output and Error Handling:

8. Given the following CSV file named "inventory.csv":

What will be the output of the following Python program? If there is any error, identify and correct it.

```
total_cost = 0
with open('inventory.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        quantity = int(row[1])
        price = float(row[2])
        total_cost += quantity * price
print('Total inventory cost:', total_cost)
```

9. Write a Python program that reads data from a CSV file named "students.csv" using the csv.reader() object. Create a dictionary where the keys are the student names and the values are lists containing their age and grade. Print the dictionary.
10. Fill in the blanks in the following code snippet to read data from a CSV file named "sales.csv" using the csv.reader() object and calculate the total sales amount. Print the total sales amount.

```
import csv
total_sales = 0
with open('sales.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        sales_amount = float(_____[2])
        total_sales += sales_amount
print('Total sales amount:', total_sales)
```

5 mark questions

1. Write a Python program that reads data from a CSV file named "inventory.csv" using the **csv.DictReader()** class. The CSV file contains columns for "Product", "Quantity", and "Price". Your program should calculate the total value of each product in inventory (quantity * price) and print a summary report showing each product's name and total value.
2. Identify and correct the error in the following Python code that attempts to open a CSV file named "data.csv" for writing using the **csv.writer()** object.

```
import csv
data = [['Name', 'Age', 'City'], ['Alice', 25, 'New York'], ['Bob', 30, 'San Francisco']]
```

with open('data.csv', 'r') as file:

writer = csv.writer(file) writer.writerows(data)

3. Fill in the blanks in the following code snippet to open a CSV file named "output.csv" in write mode and write multiple rows of data into it using the **csv.writer()** object. The data to be written includes product information (name, quantity, price) stored in a list of dictionaries.

import csv

product_data = [{'Name': 'Laptop', 'Quantity': 10, 'Price': 1200}, {'Name': 'Mouse', 'Quantity': 50, 'Price': 20}, {'Name': 'Keyboard', 'Quantity': 20, 'Price': 50}]

with open('output.csv', 'w', newline='') as file:

fieldnames = ['Name', 'Quantity', 'Price']

writer = csv.DictWriter(file, fieldnames=_____)

writer.writeheader()

writer.writerows(_____)

4. Write a Python program that reads data from a CSV file named "sales.csv" using the **csv.reader()** object. The CSV file contains columns for "Date", "Product", and "Revenue". Your program should calculate and print the total revenue earned for each product across all dates.
5. Write a Python program that reads data from two CSV files, "sales.csv" and "inventory.csv", using appropriate methods like **csv.reader()** or **csv.DictReader()**.
   The "sales.csv" file contains columns for "Date", "Product", and "Revenue", while the "inventory.csv" file contains columns for "Product" and "Quantity". Your program should combine these datasets to create a new CSV file named "combined_data.csv" that includes the columns "Date", "Product", "Revenue", and "Available Quantity". Ensure to handle missing or mismatched data appropriately.

Case study based questions-4 marks each

1. Imagine you work for a retail company that stores its daily sales data in a CSV file named "sales_data.csv". Develop a Python script using the csv module to read this file and generate a daily sales report. The report should include total sales revenue, the number of items sold, and a breakdown of sales by product category.
2. You are managing a student gradebook for a school, and the grade data is stored in a CSV file named "gradebook.csv". Design a Python program using the csv module to read and update student grades. Implement functionalities such as adding new grades, calculating average grades for each subject, and generating individual progress reports.
3. In a warehouse setting, you have an inventory CSV file named "inventory.csv" containing product details like name, quantity, and reorder level. Create a Python application using the csv module to track inventory levels, identify low-stock items (below reorder level), and generate a restocking list with recommended quantities.

4. A company receives customer feedback through an online survey, and the feedback data is stored in a CSV file named "feedback_data.csv". Develop a Python script using the csv module to read and analyze the feedback. Implement sentiment analysis to categorize feedback as positive, neutral, or negative and generate a summary report highlighting key customer sentiments.

5. You are responsible for managing personal finances and have a CSV file named "expenses.csv" containing daily expense records. Build a Python application using the csv module to read and analyze the expense data. Implement functionalities such as calculating total expenses, categorizing expenses (e.g., food, transportation), and generating a budget overview with spending trends.

ANSWERS

1.A) csv

2.B) To write data into a CSV file

3.B) 'w'

4. C) writerow()

5. B) close()

6. B) writerows()

7. D) newline=None

8. D) for loop

9. C) It ensures universal newline support.

10.D) 'x' (exclusive creation mode)

11.B) Text-based

12.D) list()

13. B) writerow()

14. C) The delimiter character separates values within a CSV file.

15. B) writerows() writes multiple rows at once, while writerow() writes one row at a time.

16.A) It requires less memory compared to other modules.

17.A) It prevents empty lines from being written.

18.C) List

19.D) DictReader() reads data as dictionaries, while reader() reads data as lists.

20. B) To ensure cross-platform compatibility for newline characters.

2 marks questions

1.The csv module in Python is used to work with CSV (Comma Separated Values) files. It provides functions to read, write, and manipulate data in CSV format, making it easier to handle tabular data.

2.

Newline handling is crucial when working with CSV files because different operating systems use different newline characters (such as '\n' for Unix/Linux and '\r\n' for Windows). If newline

handling is not done correctly, it can lead to issues like extra blank lines or improper row parsing. Using newline='' in the open() function ensures universal newline support, preventing such issues.

3.

- writerow(): Writes a single row of data into the CSV file.
- writerows(): Writes multiple rows of data into the CSV file. It takes an iterable of rows (e.g., a list of lists) and writes each row as a separate line in the CSV file.

4.

A CSV file is a text-based file format used to store tabular data. Each line in a CSV file represents a row, and values within each row are separated by a delimiter character, commonly a comma (','), although other characters like tabs or semicolons can also be used.

5.

The delimiter character is used to separate values within a CSV file. It signifies where one value ends and the next one begins within a row. Common delimiter characters include commas (','), tabs ('\t'), semicolons (';'), and pipes ('|'). The choice of delimiter depends on the data and the requirements of the CSV file.

6.

```
import csv
data = ['Name', 'Age', 'City']
with open('data.csv', 'w', newline='') as file:
    writer = csv.writer(file)
    writer.writerow(data)
```

7.

```
import csv
try:
    with open('input.csv', 'r') as file:
        reader = csv.reader(file)
        for row in reader:
            print(row)
except FileNotFoundError:
    print("File not found.")
except Exception as e:
    print("Error:", e)
```

8.

```
import csv
import random
data = [['Name', 'Age', 'City'],
        ['Alice', 25, 'New York'],
```

```
        ['Bob', 30, 'San Francisco'],
        ['Charlie', 28, 'Los Angeles']]
with open('output.csv', 'w', newline='') as file:
    writer = csv.writer(file)
    writer.writerows(data)
```

9

```
import csv
new_data = [['David', 35, 'Chicago'],
            ['Emma', 29, 'Houston']]
with open('output.csv', 'a', newline='') as file:
    writer = csv.writer(file)
    writer.writerows(new_data)
```

10.

```
import csv
def count_rows(csv_file):
    try:
        with open(csv_file, 'r') as file:
            reader = csv.reader(file)
            row_count = sum(1 for row in reader)
            return row_count
    except FileNotFoundError:
        return 0
    except Exception as e:
        print("Error:", e)
        return 0
file_path = 'data.csv'
total_rows = count_rows(file_path)
print("Total rows in", file_path, ":", total_rows)
import csv

low_stock_items = []
with open('inventory.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        if int(row[1]) < 10:  # Assuming quantity is in the second column
            low_stock_items.append(row[0])  # Assuming item name is in the first column
```

```
print("Low stock items:", low_stock_items)
```

3 MARKS QUESTIONS ANSWERS

1.

```
import csv
low_stock_items = []
with open('inventory.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        if int(row[1]) < 10:  # Assuming quantity is in the second column
            low_stock_items.append(row[0])  # Assuming item name is in the first column
print("Low stock items:", low_stock_items)
```

2.

```
import csv
total_revenue = 0
with open('sales.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        total_revenue += float(row[2])  # Assuming Price is in the third column
print('Total revenue:', total_revenue)
```

3.

```
import csv
total_salary = 0
with open('employees.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        total_salary += int(row[2])  # Assuming Salary is in the third column
print('Total salary:', total_salary)
```

4.

```
import csv
def write_student_data(file_name):
    try:
        with open(file_name, 'w', newline='') as file:
            writer = csv.writer(file)
            writer.writerow(['Name', 'Grade'])  # Write header row
```

```
        while True:
            name = input("Enter student name (or type 'exit' to quit): ")
            if name.lower() == 'exit':
                break
            grade = input("Enter student grade: ")
            writer.writerow([name, grade])
    except Exception as e:
        print("Error:", e)
write_student_data('students.csv')
```

5.

Delimiter characters in CSV files are used to separate individual fields (data values) within a row. The most common delimiter character is a comma (,), but other characters like tabs (\t), semicolons (;), and pipes (|) can also be used.

The significance of delimiter characters when working with the **csv** module in Python is that they determine how data is organized and interpreted within a CSV file. When reading a CSV file, Python uses the specified delimiter character to split each row into individual fields, making it possible to access and process the data accordingly. Similarly, when writing data to a CSV file, the delimiter character is used to separate different values within each row. Using the correct delimiter ensures that the data is correctly formatted and can be read or written without errors.

6.

```
import csv
# Define the input and output file names
input_file = 'data.csv'
output_file = 'high_scores.csv'
# Open the input and output CSV files
with open(input_file, 'r') as file:
    reader = csv.reader(file)
    with open(output_file, 'w', newline='') as output_file:
        writer = csv.writer(output_file                    # Write header row to the output file
        header = next(reader)
        writer.writerow(header)
              # Iterate through each row in the input file
        for row in reader:
            # Check if the value in the second column is greater than 50
            if int(row[1]) > 50:  # Assuming the second column contains integers
                writer.writerow(row)
```

7.import csv

```
student_data = ['Alice', 25, 'A']
with open('output.csv', 'a', newline='') as file:
    writer = csv.writer(file)
    writer.writerow(student_data)
```

8.Correct code:

```
import csv
student_data = ['Alice', 25, 'A']
with open('output.csv', 'a', newline='') as file:
    writer = csv.writer(file)
    writer.writerow(student_data)
```

output:

Total inventory cost: 500.0

9.

```
import csv
student_dict = {}
with open('students.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        name, age, grade = row
        student_dict[name] = [int(age), grade]
print(student_dict)
```

10.

```
import csv
total_sales = 0
with open('sales.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        sales_amount = float(row[2])  # Assuming sales amount is in the third column
        total_sales += sales_amount
print('Total sales amount:', total_sales)
```

5 MARKS QUESTIONS ANSWERS

1.
```
import csv
product_values = {}
with open('inventory.csv', 'r') as file:
    reader = csv.DictReader(file)
    for row in reader:
        product = row['Product']
        quantity = int(row['Quantity'])
        price = float(row['Price'])
        total_value = quantity * price
        if product in product_values:
            product_values[product] += total_value
        else:
            product_values[product] = total_value
print("Summary Report - Total Value of Each Product:")
for product, total_value in product_values.items():
    print(f"{product}: ${total_value:.2f}")
```

2.
```
import csv
data = [['Name', 'Age', 'City'], ['Alice', 25, 'New York'], ['Bob', 30, 'San Francisco']]
with open('data.csv', 'w', newline='') as file:
    writer = csv.writer(file)
    writer.writerows(data)
```

3
```
import csv
product_data = [
    {'Name': 'Laptop', 'Quantity': 10, 'Price': 1200},
    {'Name': 'Mouse', 'Quantity': 50, 'Price': 20},
    {'Name': 'Keyboard', 'Quantity': 20, 'Price': 50}
]
fieldnames = ['Name', 'Quantity', 'Price']
with open('output.csv', 'w', newline='') as file:
    writer = csv.DictWriter(file, fieldnames=fieldnames)
    writer.writeheader()
    writer.writerows(product_data)
```

4.

```
import csv
product_revenue = {}
with open('sales.csv', 'r') as file:
    reader = csv.reader(file)
    next(reader)  # Skip header row
    for row in reader:
        product = row[1]  # Assuming Product is in the second column
        revenue = float(row[2])  # Assuming Revenue is in the third column
        if product in product_revenue:
            product_revenue[product] += revenue
        else:
            product_revenue[product] = revenue
print("Total Revenue Earned for Each Product:")
for product, total_revenue in product_revenue.items():
    print(f"{product}: ${total_revenue:.2f}")
```

5.

```
import csv
# Read data from sales.csv
sales_data = {}
with open('sales.csv', 'r') as sales_file:
    reader = csv.DictReader(sales_file)
    for row in reader:
        date = row['Date']
        product = row['Product']
        revenue = float(row['Revenue'])
        if product not in sales_data:
            sales_data[product] = {'Date': date, 'Revenue': revenue}
        else:
            sales_data[product]['Revenue'] += revenue
# Read data from inventory.csv
inventory_data = {}
with open('inventory.csv', 'r') as inventory_file:
    reader = csv.DictReader(inventory_file)
    for row in reader:
        product = row['Product']
        quantity = int(row['Quantity'])
```

```
        inventory_data[product] = quantity

# Combine datasets and write to combined_data.csv
fieldnames = ['Date', 'Product', 'Revenue', 'Available Quantity']
with open('combined_data.csv', 'w', newline='') as combined_file:
    writer = csv.DictWriter(combined_file, fieldnames=fieldnames)
    writer.writeheader()
    for product, data in sales_data.items():
        if product in inventory_data:
            data['Available Quantity'] = inventory_data[product]
            writer.writerow(data)
```

4 marks questions

1,

```
import csv
def generate_sales_report(csv_file):
    total_revenue = 0
    total_items_sold = 0
    sales_by_category = {}
    with open(csv_file, 'r') as file:
        reader = csv.DictReader(file)
        for row in reader:
            revenue = float(row['Revenue'])
            total_revenue += revenue
            items_sold = int(row['Items Sold'])
            total_items_sold += items_sold
            category = row['Product Category']
            if category in sales_by_category:
                sales_by_category[category] += revenue
            else:
                sales_by_category[category] = revenue
    print("Daily Sales Report:")
    print(f"Total Revenue: ${total_revenue:.2f}")
    print(f"Total Items Sold: {total_items_sold}")
    print("Sales by Category:")
    for category, revenue in sales_by_category.items():
        print(f"{category}: ${revenue:.2f}")
generate_sales_report('sales_data.csv')
```

2.

```
import csv
def update_student_grades(csv_file, student_name, subject, grade):
    # Read existing grades
    grades = {}
    with open(csv_file, 'r') as file:
        reader = csv.DictReader(file)
        for row in reader:
            name = row['Name']
            if name not in grades:
                grades[name] = {}
            grades[name][row['Subject']] = float(row['Grade'])
    # Update or add new grade
    if student_name in grades:
        grades[student_name][subject] = grade
    else:
        grades[student_name] = {subject: grade}
    # Write updated grades to file
    fieldnames = ['Name', 'Subject', 'Grade']
    with open(csv_file, 'w', newline='') as file:
        writer = csv.DictWriter(file, fieldnames=fieldnames)
        writer.writeheader()
        for name, subjects in grades.items():
            for subject, grade in subjects.items():
                writer.writerow({'Name': name, 'Subject': subject, 'Grade': grade})
def calculate_average_grade(csv_file, subject):
    total_grade = 0
    total_students = 0
    with open(csv_file, 'r') as file:
        reader = csv.DictReader(file)
        for row in reader:
            if row['Subject'] == subject:
                total_grade += float(row['Grade'])
                total_students += 1
    if total_students > 0:
        average_grade = total_grade / total_students
        print(f"Average Grade in {subject}: {average_grade:.2f}")
```

```
    else:
        print("No data for this subject.")
def generate_progress_report(csv_file, student_name):
    with open(csv_file, 'r') as file:
        reader = csv.DictReader(file)
        for row in reader:
            if row['Name'] == student_name:
                print(f"Progress Report for {student_name}:")
                for subject, grade in row.items():
                    if subject != 'Name':
                        print(f"{subject}: {grade}")
# Example usage:
update_student_grades('gradebook.csv', 'Alice', 'Math', 85)
calculate_average_grade('gradebook.csv', 'Math')
generate_progress_report('gradebook.csv', 'Alice')
```

3.

```
import csv
def track_inventory(csv_file, reorder_level):
    low_stock_items = []
    restocking_list = {}
    with open(csv_file, 'r') as file:
        reader = csv.DictReader(file)
        for row in reader:
            name = row['Name']
            quantity = int(row['Quantity'])
            if quantity < reorder_level:
                low_stock_items.append(name)
                restocking_list[name] = reorder_level - quantity

    print("Low Stock Items:")
    for item in low_stock_items:
        print(item)
    print("Restocking List:")
    for item, quantity in restocking_list.items():
        print(f"{item}: {quantity}")
# Example usage:
track_inventory('inventory.csv', 10)
```

4.

```
import csv
from textblob import TextBlob
def categorize_feedback(csv_file):
    positive_feedback = []
    neutral_feedback = []
    negative_feedback = []
    with open(csv_file, 'r') as file:
        reader = csv.DictReader(file)
        for row in reader:
            feedback = row['Feedback']
            analysis = TextBlob(feedback)
            if analysis.sentiment.polarity > 0:
                positive_feedback.append(feedback)
            elif analysis.sentiment.polarity == 0:
                neutral_feedback.append(feedback)
            else:
                negative_feedback.append(feedback)
    print("Feedback Analysis Summary:")
    print(f"Positive Feedback ({len(positive_feedback)}):")
    for feedback in positive_feedback:
        print(feedback)
    print(f"Neutral Feedback ({len(neutral_feedback)}):")
    for feedback in neutral_feedback:
        print(feedback)

    print(f"Negative Feedback ({len(negative_feedback)}):")
    for feedback in negative_feedback:
        print(feedback)
# Example usage:
categorize_feedback('feedback_data.csv')
```

5.

```
import csv
def analyze_expenses(csv_file):
    total_expenses = 0
    expense_categories = {}
    with open(csv_file, 'r') as file:
```

```
        reader = csv.DictReader(file)
        for row in reader:
            amount = float(row['Amount'])
            total_expenses += amount
            category = row['Category']
            if category in expense_categories:
                expense_categories[category] += amount
            else:
                expense_categories[category] = amount
    print("Expense Analysis:")
    print(f"Total Expenses: “,${total_exp})
```

DATA STRUCTURE – STACK

Data Structure: A data structure is a group of data which can be processed as a single unit. This group of data may be of similar or dissimilar data types. Data Structures are very useful while programming because they allow processing of the entire group of data as a single Unit.

Types of data structures:

Linear data structures: The elements are stored in a sequential order.

Example: Array, Stack, Queue.

Non-Linear data structures: The elements are not stored in sequential order.

Example: Graph, Tree, linked lists.

Stack: It is a data structure that allows adding and removing elements in a particular order. Every time an element is added, it goes on the top of the stack; the only element that can be removed is the element that was at the top of the stack.

Two Characteristics of Stacks: It is a LIFO (Last-In First-Out) data structure, The insertion and deletion happens at one end i.e. from the top of the stack.

Operations possible in the data structure: Major operations are Traversal, Insertion, Deletion and Searching.

Major operations on Stack:

1. PUSH: The addition of elements is known as PUSH operation. It is done using the TOP position.
2. POP: Removal of elements is known as POP operation. Removal of object is always done from TOP position.
3. PEEK: To show/ display the element placed at TOP position in the stack. Few applications of stack:

1. Expression evaluation
2. Backtracking (game playing, finding paths, exhaustive searching).
3. Memory management, run-time environment for nested language features.Stack implementation using List:

1. PUSH: The addition of elements is known as PUSH operation. It is done on the TOP position.

S= [‘element1’, ‘element2’, ‘element3’, ‘element4’]

S.append(‘newElement’) # pushing element in stack at the TOP

S= [‘element1’, ‘element2’, ‘element3’, ‘element4’, ‘newElement’] #List after insertion

2. POP: Removal of elements is known as POP operation. It is also done using the TOP position.

S= [‘element1’, ‘element2’, ‘element3’, ‘element4’, ‘newElement’]

S.pop() # removes element at top
S= [‘element1’, ‘element2’, ‘element3’, ‘element4’] #List after deletion
3. PEEK: To show/ display the element placed at TOP position in the stack.
return S[-1] # shows element at top but do not remove it from the stack.

Questions

1.	Consider a list named **Nums** which contains random integers. Write the following user defined functions in Python and perform the specified operations on a stack named **BigNums**. (i) **PushBig():** It checks every number from the list **Nums** and pushes all such numbers which have 5 or more digits into the stack, **BigNums.** (ii) **PopBig():** It pops the numbers from the stack, BigNums and displays them. The function should also display “**Stack Empty**” when there are no more numbers left in the stack. For example: If the list Nums contains the following data: **Nums**=[213, 10025, 167, 254923, 14, 1297653, 31498, 386, 92765] Then on execution of **PushBig(),**the stack **BigNums** should store: [10025, 254923, 1297653, 31498, 92765] And on execution of **PopBig(),** the following output should be displayed: 92765 31498 1297653 254923 10025 Stack Empty

ANS	def PushBig(Nums,BigNums):
	for N in Nums:
	if len(str(N))>=5:
	BigNums.append(N)
	def PopBig(BigNums):
	while BigNums:
	print(BigNums.pop())
	else:
	print(“Stack Empty”)

2.	A list, NList contains following record as list elements: [City, Country, distance from Delhi] Each of these records are nested together to form a nested list. Write the following user defined functions in Python to perform the specified operations on the stack named travel. (i) **Push_element(NList):** It takes the nested list as an argument and pushes a list object containing name of the city and country, which are not in India and distance is less than 3500 km from Delhi. (ii) **Pop_element():** It pops the objects from the stack and displays them. Also, the function should display “Stack Empty” when there are no elements in the stack. **For example: If the nested list contains the following data:** NList=[["New York", "U.S.A.", 11734], ["Naypyidaw", "Myanmar", 3219], ["Dubai", "UAE", 2194], ["London", "England", 6693],

	["Gangtok", "India", 1580], ["Columbo", "Sri Lanka", 3405]] **The stack should contain:** ['Naypyidaw', 'Myanmar'], ['Dubai', 'UAE'], ['Columbo', 'Sri Lanka'] **The output should be:** ['Columbo', 'Sri Lanka'] ['Dubai', 'UAE'] ['Naypyidaw', 'Myanmar'] Stack Empty

ANS	`travel = []`
	`def Push_element(NList):`
	`  for L in NList:`
	`  if L[1] != "India" and L[2]<3500:`
	`  travel.append([L[0],L[1]])`
	
	`def Pop_element():`
	`  while len(travel):`
	`  print(travel.pop())`
	`  else:`
	`  print("Stack Empty")`

3.	**(a) A list contains the following record of customer:** [Customer_name, Room Type] Write the following user-defined functions to perform given operations on the stack named ' Hotel': i) Push_Cust () - To Push customers names of those customers who are staying in Delux' Room Type. ii) Pop_Cust ()- To Pop the names of customers from the stack and display them. Also, display "Underflow" when there are no customers in the stack. For example: **If the lists with customer details are as follows:** ["siddarth", "Delux"] ["Rahul", "Standard"] ["Jerry", "Delux"] **The stack should contain** Jerry Siddharth **The output should be:** Jerry Siddharth Underflow b) Write a function in Python, Push (Vehicle) where, Vehicle is a dictionary containing details of vehicles - {Car_Name: Maker}. The function should push the name of car manufactured by "TATA' (including all the possible cases like Tata, TaTa, etc.) to the stack. For example: If the dictionary contains the following data: Vehicle={"Santro" : "Hyundai", "Nexon": "TATA", "Safari" : "Tata"} The stack should contain Safari Nexon

ANS

a) customer=[["Siddarth", "Delux"], ["Rahul", "Standard"], ["Jerry", "Delux"]]

```
hotel=[]
def push_cust():
  for i in customer:
    if i[1]=='Delux':
      hotel.append(i[0])
  return hotel

def pop_cust():
  if hotel==[]:
    return "Underflow"
  else:
    return hotel.pop()

push_cust()
while True:
  if hotel==[]:
    print(pop_cust())
    break
  else:
   print(pop_cust())
```

b) Vehicle={"Santro" : "Hyundai", "Nexon": "TATA", "Safari" : "Tata"}

```
stk=[]
def push(vehicle):
  for i in vehicle:
    if vehicle[i].lower()=='tata':
       stk.append(i)
    return stk

push(Vehicle)
for i in range(-1,-len(stk)-1,-1):
  print(stk[i])
```

4.

A list contains following record of a customer:
[Customer_name, Phone_number, City]

Write the following user defined functions to perform given operations on the stack named '**status**':
(i) Push_element() - To Push an object containing name and Phone number of customers who live in Goa to the stack
(ii) Pop_element() - To Pop the objects from the stack and display them. Also, display "Stack Empty" when there are no elements in the stack.

For example:
If the lists of customer details are:

["Gurdas", "99999999999","Goa"]
["Julee", "8888888888","Mumbai"]
["Murugan","77777777777","Cochin"]
["Ashmit", "1010101010","Goa"]

	The stack should contain [“Ashmit”,”1010101010”] [“Gurdas”,”9999999999”] The output should be: [“Ashmit”,”1010101010”] [“Gurdas”,”9999999999”] Stack Empty

ANS	status=[]
	def Push_element(cust):
	if cust[2]=="Goa":
	L1=[cust[0],cust[1]]
	status.append(L1)
	
	def Pop_element ():
	num=len(status)
	while len(status)!=0:
	dele=status.pop()
	print(dele)
	num=num-1
	else:
	print("Stack Empty")

5.	Write a function in Python, Push(SItem) where , SItem is a dictionary containing the details of stationary items– {Sname:price}. The function should push the names of those items in the stack who have price greater than 75. Also display the count of elements pushed into the stack. For example: If the dictionary contains the following data: Ditem={"Pen":106,"Pencil":59,"Notebook":80,"Eraser":25} The stack should contain Notebook Pen The output should be: The count of elements in the stack is 2

ANS	stackItem=[]
	def Push(SItem):
	count=0
	for k in SItem:
	if (SItem[k]>=75):
	stackItem.append(k)
	count=count+1
	print("The count of elements in the stack is : ", count)

6.	Julie has created a dictionary containing names and marks as key value pairs of 6 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 75.

	● Pop and display the content of the stack. For example: If the sample content of the dictionary is as follows: R={"OM":76, "JAI":45, "BOB":89, "ALI":65, "ANU":90, "TOM":82} The output from the program should be: TOM ANU BOB OM

ANS	R={"OM":76, "JAI":45, "BOB":89, "ALI":65, "ANU":90, "TOM":82}
	def PUSH(S,N):
	S.append(N)
	def POP(S):
	if S!=[]:
	return S.pop()
	else:
	return None
	ST=[]
	for k in R:
	if R[k]>=75:
	PUSH(ST,k)
	while True:
	if ST!=[]:
	print(POP(ST),end=" ")
	else:
	break

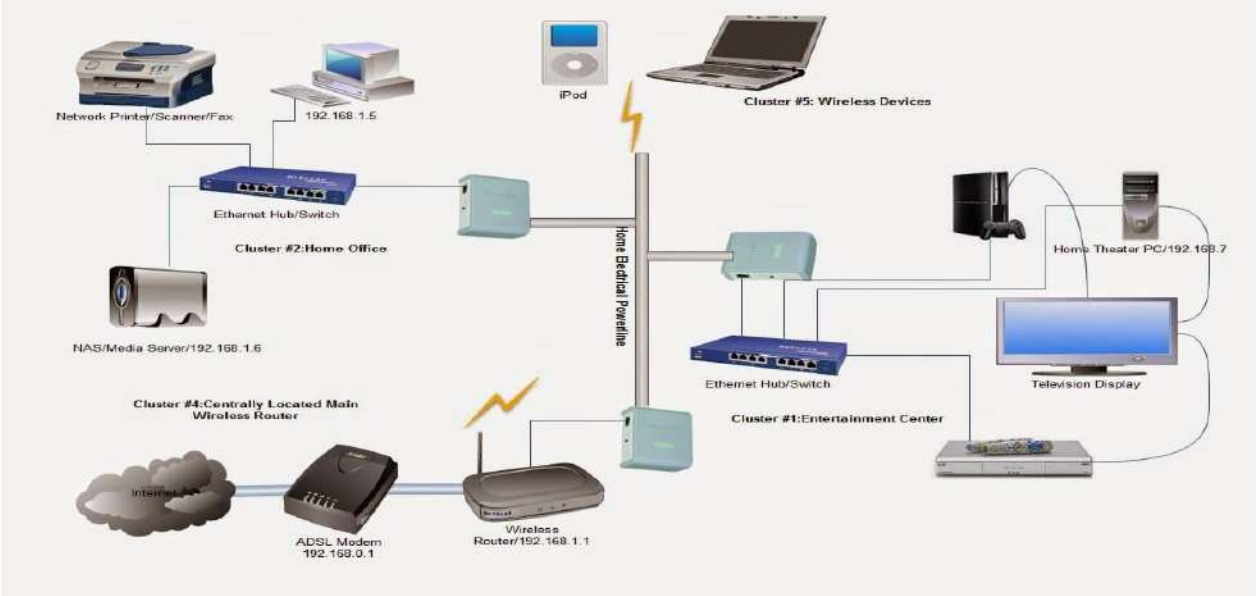
7.	Alam has a list containing 10 integers. You need to help him create a program with separate user defined functions to perform the following operations based on this list. ● Traverse the content of the list and push the even numbers into a stack. ● Pop and display the content of the stack. For Example: If the sample Content of the list is as follows: N=[12, 13, 34, 56, 21, 79, 98, 22, 35, 38] Sample Output of the code should be: 38 22 98 56 34 12

ANS	N=[12, 13, 34, 56, 21, 79, 98, 22, 35, 38]
	def PUSH(S,N):
	S.append(N)
	def POP(S):
	if S!=[]:
	return S.pop()
	else:
	return None
	ST=[]
	for k in N:
	if k%2==0:
	PUSH(ST,k)
	while True:
	if ST!=[]:
	print(POP(ST),end=" ")
	else:
	break

Unit : 2 introduction to Computer Networks

Network:-

The collection of interconnected computing devices is called a network. Two computing devices are said to be interconnected if they are capable of sharing and exchanging information.



Benefits of Network: -

(1) Resource Sharing: Resource Sharing means to make the applications/programs, data(files) and peripherals available to anyone on the network irrespective of the physical location of the resources and the user.

(2) Reliability: Reliability means to keep the copy of a file on two or more different machines, so if one of them is unavailable (due to some hardware crash or any other) them its other copy can be used.

(3) Cost Factor: Cost factor means it greatly reduces the cost since the resources can be shared. For example a Printer or a Scanner can be shared among many computers in an office/Lab.

(4) Communication Medium: Communication Medium means one can send and receive messages. Whatever the changes at one end are done, can be immediately noticed at another.

EVOLUTION OF NETWORKING

ARPANET (1969) – US Government formed an agency named ARPANET(Advanced Research Project Agency Network) to connect computers at various universities and defence agencies to share data/information efficiently among all of them.

NSFNET (1985) - National Science Foundation Network was a program of coordinated, evolving projects sponsored by the National Science Foundation (NSF) from 1985 to 1995 to promote advanced research and education networking in the United States. The program created several nationwide backbone computer networks in support of these initiatives. Initially created to link researchers to the NSF-funded supercomputing centers, through further public funding and private industry partnerships it developed into a major part of the Internet backbone.

INTERNET (1990)- INTER-connection NETwork , The worldwide network of networks.

Data communication terminologies:

Concept of communication: Communication is the act of sending and receiving data from one device to another device or vice-versa. Data can be of any form i.e. text, image, audio, video and multimedia files.

Components of Data communication:

Sender: A device that can send data over a network i.e. computer, laptop, smart phone etc.

Receiver: A device can receive data over a network i.e. computer, laptop, smart phone etc.

The sender and receivers are basically called **nodes**.

Message: It is the data/information that needs to be shared between the sender and receiver.

Communication media: It is the medium through which the data/information is travelled between the
sender and receiver. These may be wired or wireless.

Protocols: A network protocol is an established set of rules that determine how data is transmitted between different devices in the same network. Essentially, it allows connected devices to communicate with each other, regardless of any differencesin their internal processes, structure or design.

Measuring Capacity of Communication Media: In data communication, the transmission medium is also known as channel. The capacity of a channel is the maximum amount of signals or traffic that a channel can carry. It is measured in terms of bandwidth and data transfer rate as described below:

Bandwidth

Bandwidth of a channel is the range of frequencies available for transmission of data through that channel.

Higher the bandwidth, higher the data transfer rate.

Normally, bandwidth is the difference of maximum and minimum frequency contained in the composite signals.

Bandwidth is measured in Hertz (Hz). 1
KHz = 1000 Hz, 1 MHz =1000

Data Transfer Rate

Data travels in the form of signals over a channel. One signal carries one or more bits over the channel. Data transfer rate is the number of bits transmitted between source and destination in one second. It is also known as bit rate. It is measured in terms of bits per second (bps). The higher units for data transfer rates are:

1 Kbps=1024 bps
1 Mbps=1024 Kbps
1 Gbps=1024 Mbps

IP Address:

An IP address is a unique address that identifies a device on the internet or a local network. IP stands for "Internet Protocol," which is the set of rules governing the format of data sent via the internet or local network.

Switching techniques:

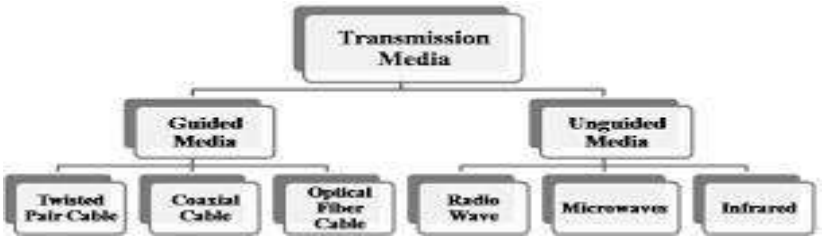
In large networks, there may be more than one path for transmitting data from sender to receiver. Selecting a path that data must take out of the available options is called switching. There are two popular switching techniques – **circuit switching and packet switching**.

Circuit switching: Circuit switching is a type of network configuration in which a physical path is obtained and dedicated to a single connection between two endpoints in the network for the duration of a dedicated connection. Ordinary landline telephone service uses circuit switching.

Packet switching: Packet switching is the method by which the internet works; it features delivery of packets of data between devices over a shared network. For example the school web server is sending you a webpage over the internet or you sending an email to a friend.

Transmission Media: Transmission media is a communication channel that carries the information from the sender to the receiver. All the computers or communicating devices in the network must be connected to each other by a Transmission Media or channel.

- A Transmission medium is a medium of data transfer over a network.
- The selection of Media depends on the cost, data transfer speed, bandwidth and distance. Transmission media may be classified as



Transmission Media: Guided (Wired)

Twisted Pair Cable: Twisted pair or Ethernet cable is most common type of media which consists four insulated pairs of wires twisted around each other. It is low-cost, low-weight and easy to install flexible cables. It can transfer data up to 1Gbps speed covering 100 meters distance. It uses RJ-45 Connector for connecting computers and network devices. **Co-axial Cable:** This type of cable consists a solid insulated wire surrounded by wire mesh, each separated by some kind of foil or insulator. The inner core carries the signal and mesh provides the ground. Co-axial Cable or Coax, is most common in Cable TV transmission. It can carry data up to 500 meters.

Fiber Optic Cable: Optical fiber consists of thin glass or glass like material and carries light signals instead of electric current. Signal are modulated and transmitted in the form of light pulses from source using Light Emitting Diode (LED) or LASER beam. Optical fibers offer secure and high-speed transmission up to a long distance.

Transmission Media: Unguided (Wireless)

Infrared Wave: It used for short-range (approx. 5 meters) communication using wireless signals. It is mostly used in Remote operated devices like TV, Toys, Cordless phones etc.

Radio waves: Radio wave uses Radio frequencies (3KHz-3 GHz) to make broadcast network like AM/FM network within city. Radio wave propagates in Omni direction (surrounding) and penetrate solid walls/buildings.

Microwaves: Microwave are high energy radio waves, used for line of sight communication using Parabolic antenna aligned with each other. It is high speed wave and can cover distance up to 100 km).

Network Devices: Hardware device that are used to connect computers, printers, fax machines and other electronic devices to a network are called network device. There are many types of network devices used in networking and some of them are described below:

MODEM (Modulator Demodulator): It is a device that converts digital signal to analog signal (modulator) at the sender's site and converts back analog signal to digital signal (demodulator) at the receiver's end, in order to make communication possible via telephone lines. It enables a computer to transmit data over telephone or cable lines.

There are two types of MODEM, which are as follows

(i) Internal Modem Fixed within a computer.

(ii) External Modem Connected externally to a computer.

Ethernet card: An Ethernet card in your computer serves one basic function: to transmit data from the network to your computer. Ethernet cards are physical expansion cards that insert into a PCI expansion slot on a computer.

RJ45: RJ45 connectors are commonly seen with Ethernet network cables. Ethernet cables with RJ45 connectors are also called RJ45 cables. These RJ45 cables feature a small plastic plug on each end, and the plugs are inserted into RJ45 jacks of Ethernet devices.

Hub: A Hub is a connecting device which connects multiple computers together to form a Local Area Network (LAN). Hubs make broadcast type Network and do not manage traffic over the network channel. Signal entering any port is broadcast out on all other ports. *It broadcast the signals to all computers connected in the network.* It provides various RJ-45 ports to connect Twisted Pair cable in STAR topology, making them act as a single network segment. Now days, Switch is used in place of Hubs.

Types of Hub:

- ***Active Hub:*** *Amplifies the signal when required and works as a Repeater.*
- ***Passive Hub:*** *It simply passes the signal without any change*.

Switch: A switch is a hardware device, which is used to connect several nodes to form a Network. *It redirects the received signals only to the intended Node i.e. controls Network traffic.*It is also used to segment a big network into different Sub networks (Subnet) to control the network traffic and security. It can also use to combine various small network segments to form a big Network (as in Tree topology).

Hub V/s Switch: There is a vast difference between switch and hub. A hub forwards each incoming packet (data) to all the hub ports, while a switch forwards each incoming packet to the specified recipient.

Repeater: Repeater is a hardware device, which is used to amplify the signals when they are transported over a long distance. The basic function of a repeater is to amplify the incoming signal and retransmit it, to the other device.

Router: A router is used to connect different networks together. i.e. for two or more LANs to be interconnected, you need a router

- The basic role of Routers in a network is to determine the best possible route (shortest path) for the data packets to be transmitted. In a large network (WAN), multiple routers works to facilitate speedy delivery of data packets.
- Router maintains a table of addresses (called routing table) that keeps a track of paths connected to it.

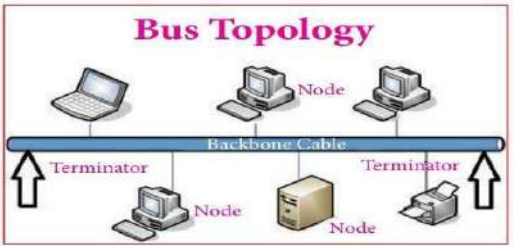
Gateway:

- A gateway is a device, which is used to connect dissimilar networks. The gateway establishes an intelligent connection between a local network and external networks, which are completely different in structure.
- Gateway is also called protocol converter that convert data packets from one protocol to other and connects two dissimilar networks.
- A gateway can be implemented in hardware, software or both, but they are usually implemented by software installed within a router.
- A LAN gets connected to Internet (WAN) using a gateway.

Network Topologies:

Topology: Topology refers to the way in which the device/computer/workstations attached to the network are interconnected.

The layout of interconnection of devices in a network is called Topology.



Different Topologies are: Star, Bus, Tree, Mesh.

BUS Topology: - The bus topology uses a common single cable (backbone cable) to connect all the workstations. Each computer performs its task of sending messages without the help of the central server. However, only one workstation can transmit a message at a particular time in the bus topology.

Advantages:

(i) Easy to connect and install.
(ii) Involves a low cost of installation time.
(iii) Can be easily extended.

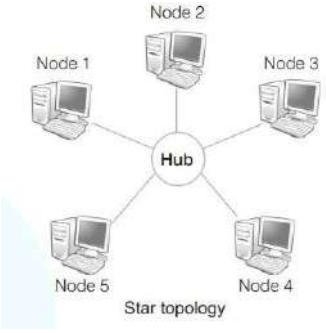
Disadvantages:-

(i) The entire network shuts down if there is a failure in the central cable.
(ii) Only a single message can travel at a particular time.
(iii) Difficult to troubleshoot an error.

STAR Topology: -In Star topology, each node is directly connected to a central device like Hub or Switch. It is most popular topology to form Local Area Networks (LAN).

Advantages:

(i) Easy to troubleshoot
(ii) A single node failure does not affects the entire network.
(iii) Fault detection and removal of faulty parts is easier.
(iv) In case a workstation fails, the network is not affected.



Star topology

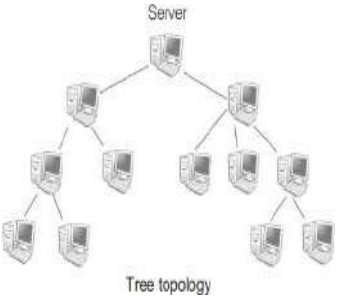
Disadvantages: -

(i) Difficult to expand.
(ii) Longer cable is required.
(iii) The cost of the hub and the longer cables makes it expensive over others.
(iv) All nodes are dependent on central node. if the central device (Switch) goes down then entire network breaks down.

TREE Topology: - The tree topology combines the characteristics of the linear bus and the star topologies. It consists of groups of star – configured workstations connected to a bus backbone cable.

Advantages:

(i) Eliminates network congestion.
(ii) The network can be easily extended.
(iii) Faulty nodes can easily be isolated from the rest of the network.



Tree topology

Disadvantages:

- Uses large cable length.
- Requires a large amount of hardware components and hence is expensive.
- Installation and reconfiguration are very difficult.

Types of Computer Network:

A computer network may be small or big as per number of computers and other network devices linked together. A computer network may contain devices ranging from handheld devices (like mobile phones, tablets, laptops) connected through Wi-Fi or Bluetooth within a single room to the millions of computers spread across the globe. Based on the size, coverage area, data transfer speed and complexity, a computer network may be classified as:

LAN (Local Area Network): A Local Area Network (LAN) is a network that is limited to a small area. It is generally limited to a geographic area such as within lab, school or building. It is generally privately-owned networks over a distance up to a few kilometers. Now-a-days, we also have WLAN (Wireless LAN) which is based on wireless network.

MAN (Metropolitan Area Network): MAN is the networks cover a group of nearby corporate offices or a city and might be either private or public. Cable TV network or cable based broadband internet services are examples of MAN.

WAN (Wide Area Network): These are the networks spread over large distances, say across countries or even continents through cabling or satellite uplinks are called WAN. Typically, a WAN combines multiple LANs that are geographically separated. It is a network of network. The world's most popular WAN is the Internet.

PAN (Personal Area Network): A Personal Area Network is computer network organized around an individual person. It generally covers a range of less than 10 meters. Personal Area Networks can be constructed with cables or wirelessly.

Comparison between PAN, LAN, MAN and WAN: -

Parameter	PAN	LAN	MAN	WAN
Area covered	Small Area (upto 10m radius)	A building or campus (upto 1 km)	A city (upto 100 Km radius)	Entire country, Continent or Globe
Networking Cost	Negligible	inexpensive	expensive	Very expensive
Transmission	Speed High speed	High speed	Moderate speed	Low speed
Error Rate	Lowest	Lowest	Moderate	Highest
Network Devices used	WLAN, USB Dongle, Blutooth	LAN/WLAN, HUB/Switch, Repeater, Modem	Router, Gateway	Router, Gateway
Technology/ Media used	infrared, Bluetooth	Ethernet, Wi-Fi	Optical fiber, Radio wave, Microwave	Microwave, Satellite

Network Protocols:

HTTP (Hyper Text Transfer Protocol) :

- The Hyper Text Transfer Protocol is a set of rules which is used to access/retrieve linked web pages across the web using web browser program.
- The more secure and advanced version is HTTP is HTTPS (HTTP Secure), which controls the transfer of information in encrypted form to provide more security and privacy.
- Other protocols like File Transfer Protocol (FTP) and Telnet can also be used with URL. FTP is used to transfer files from web server to web client or vice-versa.

- Telnet is protocol which used for login on remote computer to access/transfer files or trouble shooting.

FTP (File Transfer Protocol) is a network protocol for transmitting files between computers over Transmission Control Protocol/Internet Protocol (TCP/IP) connections. **Point-to-Point Protocol (PPP)** is a TCP/IP 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.

TCP/IP stands for **Transmission Control Protocol/Internet Protocol** and is a suite of communication protocols used to interconnect network devices on the internet. TCP/IP is also used as a communications protocol in a private computer network.

TELNET is commonly used by **terminal emulation programs that allow you to log into a remote host**. However, TELNET can also be used for terminal-to-terminal communication and interprocess communication. TELNET is also used by other protocols (for example, FTP) for establishing a protocol control channel.

E-Mail (Electronic Mail):

Email is the short form of electronic mail. It is one of the ways of sending and receiving message(s) using the Internet. An email can be sent anytime to any number of recipients at anywhere. The message can be either text entered directly onto the email application or an attached file (text, image, audio, video, etc.) stored on a secondary storage. An existing file can be sent as an attachment with the email.

E-Mail Protocols:

Email are handled and exchanged through various mail servers in order to deliver email to mail client. The mail client and mail servers exchange information with each other using some protocols. The followings are commonly used protocols for email handling-

SMTP (Simple Mail Transfer Protocol): This protocol is used to send emails from sender to recipient's mail server.

IMAP (Internet Message Access Protocol): This is a standard client/server protocol for accessing e-mails from local e-mail server.

POP3 (Post Office Protocol 3): This protocol facilitates users to access mailboxes and download messages to their computer.

Voice over Internet Protocol (VoIP):

- Voice over Internet Protocol or VoIP, allows voice call (telephone service) over the Internet. VoIP offers voice transmission over a computer network (IP) rather than through the regular telephone network. It is also known as Internet Telephony or Broadband Telephony. Examples of VoIP:- WhatsApp, Skype, Google Chat etc.
- VoIP works on the principle of converting the analogue voice signals into digital and then transmitting them over the broadband line.
- These services are either free or very economical. That is why these days international calls are being made using VoIP.

Overview of Internet:

- Internet is a network of networks that consists of millions of private, public, academic, business, and government networks, that are linked by various wired, wireless, and optical networking technologies.
- The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to serve several billion users worldwide.

- The modern Internet is an extension of ARPANET (Advance Research Project Agency Network), created in1969 by the American Department of Defense.
- In 1990 the British Programmer Tim Berners-Lee developed Hypertext and HTML to create World Wide Web (WWW).
- The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW), the communicational infrastructure to support mail, chat and transfer of Text, Images, Audio, Video etc.

Introduction to web services:

World Wide Web (WWW):
World Wide Web, which is also known as a Web, is a collection of websites or web pages stored in web servers and connected to local computers through the internet. These websites contain text pages, digital images, audios, videos, etc. Users can access the content of these sites from any part of the world over the internet using their devices such as computers, laptops, cell phones, etc. The WWW, along with internet, enables the retrieval and display of text and media to your device.
There sources of the Web (HTML pages) are transferred via the Hypertext Transfer Protocol (HTTP), may be accessed by users by a software application called a web browser, and are published by a software application called a web server.
Tim Berners-Lee—a British computer scientist invented the revolutionary World Wide Web in 1990 by defining three fundamental technologies that lead to creation of www: HTML ,URL, HTTP.

HTML(Hyper Text Markup Language):
Hyper Text Markup Language (HTML) is a language which is used to design standardized Web Pages, so that the Web contents can be read and under stood from any computer using web browser.
Basic structure of every web page is designed using HTML. HTML uses tags to define the way page content should be displayed by the web browser. Web pages are stored as .html or .htm files.
Extensible Markup Language (XML): Extensible Markup Language is a markup language and file format for storing, transmitting, and reconstructing arbitrary data. It defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

Domain Name: A domain name is a unique, easy-to-remember address used to access websites, such as 'google.com', and 'facebook.com'.

URL(Uniform Resource Locator):
URL—Uniform Resource Locator is a unique address of web resources located on the web. It provides the location and mechanism (protocol) to access the resource. URL is sometimes also called a web address.
A URL contains protocol, domain, sub domain and name of web page along with directory.

In the above URL, http is the protocol name, it can be https, http, FTP, Telnet, etc. www is a sub domain. ncert.nic.in is the domain name. Textbook is directory and *textbook.htm* is webpage.

The complete unique address of the page on a website is called **URL** (Uniform Resource Locator) e.g. *http://www.cbse.nic.in/welcome.html*

Since computers on the network are identified by its IP addresses, so it is required to convert a Domain name or URL typed in the Browser, in to its corresponding IP address. This process is called Domain Name Resolution. This resolution is done by the designated servers called DNS servers, provided by the Internet Service Providers (ISP) like BSNL, Airtel, Jio etc.

Website:

- Website is a collection of related web pages that may contain text, images, audio and video. The first page of a website is called home page. Each website has specific internet address (URL) that you need to enter in your browser to access a website.
- A website is a collection of web pages related through hyperlinks, and saved on a web server. A visitor can navigate pages by clicking on hyperlinks.
- The main purpose of website is to make the information available to people at large. For example, a company may advertise or sell its products, a government organization may publish circulars, float tenders, invite applications for recruitments etc.
- A website can be accessed by providing the address of the website (URL) in the browser. The main page of website (Home page) will be open when it is opened on the browser.

Web Page:

- A web page is a document on the WWW that is viewed in a web browser. Basic structure of a web page is created using HTML (Hyper Text Markup Language).
- To make web pages more attractive, various styling CSS (Cascading Style Sheets) and formatting are applied on a web page.
- Further, program codes called scripts also used to make webpage interactive and define different actions and behavior. JavaScript, PHP and Python are commonly used script language.
- The first page of the website is called a home page which contains Menus and Hyperlinks for other web pages.
- A web page is usually a part of a website and may contain information in different forms, such as: text, images, audio & video, Hyperlinks, interactive contents (chat etc.)

A web page can be of two types: Static Web Page and Dynamic Web Page

Web Browsers:

- A web browser or simply 'browser' is a software application used to access information on the World Wide Web. When a user requests some information, the web browser fetches the data from a web server and then displays the webpage on the user's screen.
- The popular web browsers are Google Chrome, Mozilla Firefox, Internet Explorer, Opera, Safari, Lynx and Netscape Navigator, Microsoft Edge etc.
- A web browser essentially displays the HTML documents which may include text, images, audio, video and hyperlinks that help to navigate from one web page to another. The modern browsers allow a wide range of visual effects, use encryption for advanced security and also have cookies that can store the browser settings and data.

Web Server:

- A web server is used to store and deliver the contents of a website to web clients such as a browser.
- A Computer stores web server software and a website's contents (HTML pages, images, CSS style sheets, and JavaScript files). The server needs to be connected to the Internet so that its contents can be made accessible to others.
- Web server as a software, is a specialized program that understands URLs or web addresses coming as requests from browsers, and responds to those requests.
- The server is assigned a unique domain name so that it can be accessed from anywhere using Internet. The web browser from the client computer sends a HTTP request for a page containing the desired data or service. The web server then accepts request, interprets, searches and responds (HTTP response) against request of the web browser. The requested web page is then displayed in the browser of the client. If the requested web page is not found, web server generates "Error: 404 Not found" as a response.

Web Hosting:

- A web hosting service is a type of Internet hosting service that allows individuals and organisations to make their website accessible via the World Wide Web. In Simple, uploading of website on Web Server is known as hoisting. To upload the website, we need some web space on server to upload website. This space is available on some nominal charges.
- All web servers are assigned a unique numeric address called IP address when connected to the Internet. This IP address needs to be mapped/changed to domain name (Textual name) of the website using DNS (Domain Name Service). Thus, user can access website by providing domain name through a browser (URL). The domain name has to be registered (purchased) with an authorized agency i.e. Registrar Domain Names.

QUESTIONS ON COMPUTER NETWORKING

MULTIPLE CHOICE QUESTIONS(1 MARK EACH)

1. _____ is a communication methodology designed to deliver both voice and multimedia communications over Internet protocol.
   (A) SMTP **(B) VoIP** (C) PPP (D) HTTP

2. Which of the following is used to receive emails over Internet?
   a) SMTP **b) POP** c) PPP d) VoIP

3. What is the size of IPv4 address?
   (a)32 bits (b) 64 bits (c) 64 bytes (d) 32 bytes

4. _____protocol provides access to command line interface on a remote computer.
   a)FTP **b)Telnet** c)VoIP d)SMTP

5. _____is a communication methodology designed to deliver electronic mail (E-mail) over the internet.
   (a) VoIP (b) HTTP (c) PPP **(d) SMTP**

6. Which protocol is used for transferring files over a TCP/IP network?
   a) **FTP** b) SMTP c) PPP d) HTTP

7. Network in which every computer is capable of playing the role of a client, or a server or both at same time
   is called
   a) local area network **b) peer-to-peer network** c) dedicated server network d) wide area network

8. .....is a communication methodology designed to establish a direct and dedicated communication between an internet user and his/her ISP.
   a) VoIP (b) SMTP **(c) PPP** (d)HTTP

9. Identify the device on the network which is responsible for forwarding data from one device to another
   (a) NIC **(b) Router** (c) RJ45 (d) Repeater

10. Which of the following device send data to every connected node?
    a)Switch b)Repeater c)Router **d) Hub**

11. In which type of switching first the connection is established between sender and receiver and then the data is transferred?
    a) **Circuit** b)Message c)Packet d)None

12. Identify the cable which consists of an inner copper core and a second conducting outersheath:
(i)Twisted Pair **(ii) Co-axial** (iii) Fiber Optical (iv) Shielded Twisted Pair

13. In fiber optic transmission, data is travelled in the form of:

(i) **Light** (ii) Radio link (iii) Microwave Link (iv) Very low frequency

14. Which of the following devices modulates digital signals into analog signals that can be sentover traditional telephone lines?
(i) Router (ii) Gateway (iii) Bridge **(iv) Modem**

15. Out of the following guided media, which is not susceptible to external interference?
(i) Twisted Pair (ii) Co-axial Cable **(iii) Fiber Optical** (iv) Electric Wire

16. Which of the following device is used for sorting and distribution of data packet to theirdestination based on their IP Address?
(i) Gateway **(ii) Router** (iii) Bridges (iv) Switch

17. Which of the following device is used to connect network of different protocols so that theycan communicate properly?
(i) **Gateway** (ii) Router (iii) Bridges (iv) Switch

18. Which type of Network is generally privately owned and links the devices in a single office,building or Campus?
a. **LAN** b. MAN c. WAN d. PAN

19. Raj, is working as a Tech Support Engineer and sometimes he wants to work on Client'scomputer from his office. Identify the traditional protocol used for this purpose?
a. FTP **b.Telnet** c,HTTP d.POP3

20. Raj is looking for some information about How Router works, for this he opens the browser and typed the URL of requested site. In few moments he received the requested page on his browser screen. Identify the type of protocol, used between Browser (Client) and Web Server for the communication?
a. TCP/IP **b.HTTP** c,SMTP d.POP3

2 MARKS QUESTIONS

1. Write two points of difference between Bus topology and star topology.
2. Write two points of difference between XML and HTML.
3. Write the full forms of the following:
(i) HTTP (ii) FTP
4. Discuss the use of TELNET
5. Write two advantages and two disadvantages of circuit switching.
6. Differentiate between Web server and web browser. Write any two popular web browsers.
7. Classify each of the following Web Scripting as Client Side Scripting and Server SideScripting :
(i) Java Scripting
(ii) ASP
(iii) VB Scripting
(iv) JSP
8. What is Bandwidth? What is the measuring unit of Bandwidth in term of range

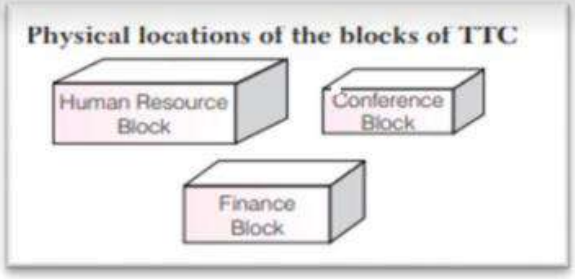
of frequencies a channel can pass?

9. (a) Write the full forms ithe following:
   (i) FTP (ii) HTTPS
   b)Name the protocols which are used for sending and receiving emails?

10. Write two differences between Coaxial and Fiber transmission media.

5 MARKS QUESTIONS

1. A professional consultancy company is planning to set up their new offices in India with its hub at
Hyderabad. As a network adviser, you have to understand their requirement and suggest them the best
available solutions. Their queries are mentioned as (i) to (v) below.



Block to block distance (in m)

Block (From)	Block (To)	Distance
Human Resource	Conference	110
Human Resource	Finance	40
Conference	Finance	80

Expected number of computers

Block	Computers
Human Resource	25
Finance	120
Conference	90

a) Which will be the most appropriate block, where TTC should plan to install their server?

b) Draw a block to block cable layout to connect all the buildings in the most appropriate manner for efficient communication.

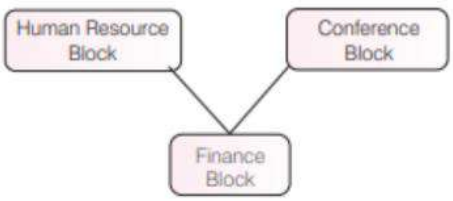
c) What will be the best possible connectivity out of the following, you will suggest to connect the new setup of offices in Bengalore with its London based office.
- Satellite Link
- Infrared
- Ethernet

d) Which of the following device will be suggested by you to connect each computer in each of the buildings?
- Switch
- Modem
- Gateway

e) Company is planning to connect its offices in Hyderabad which is less than1 km. Which type of network will be formed?

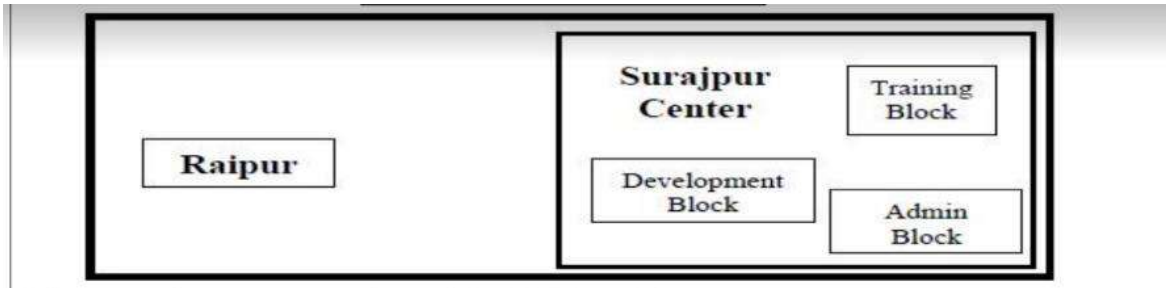
Sol: (i) The company should install its server in finance block as it is having maximum number of computers.

(ii) The layout is based on minimum cable length required, which is 120 metres in the above case.



(iii) Satellite Link.
(iv) Switch.
(v) LAN

2. FutureTech Corporation, a Bihar based IT training and development company, is planning to set up training centers in various cities in the coming year. Their first centeris coming up in Surajpur district. At Surajpur center, they are planning to have 3different blocks - one for Admin, one for Training and one for Development. Each block has number of computers, which are required to be connected in a network for communication, data and resource sharing. As a network consultant of this company,you have to suggest the best network related solutions for them for issues/problems raised in question nos. (i) to (v), keeping in mind the distances between variousblocks/locations and other given parameters.



Distance between various blocks/locations:

Block	Distance
Development to Admin	28 m
Development to Training	105 m
Admin to Training	32 m
Surajpur Campus to Coimbatore Campus	340 km

Number of computers:

Block	Number of Computers
Development	90
Admin	40
Training	50

(i) Suggest the most appropriate block/location to house the SERVER in the Surajpur center (out of the 3 blocks) to get the best and effective connectivity. Justify your answer.

(ii) Suggest why should a firewall be installed at the Surajpur Center?

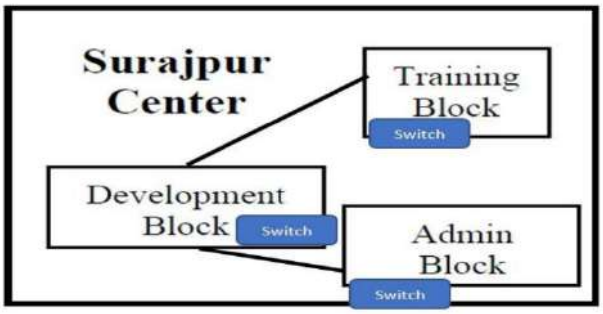
(iii) Suggest the best wired medium and draw the cable layout (Block to Block) to most efficiently connect various blocks within the Surajpur Center.

(iv) Suggest the placement of the following devices with appropriate reasons:
a) Switch/Hub b) Router

(v) Suggest the best possible way to provide wireless connectivity between Surajpur Center and Raipur Center.

Sol: i) Development because it contains more number of computers
ii) Surajpur centre has multiple blocks and firewall ensures security. So it is required. It allows or block unwanted attacks.

iii)

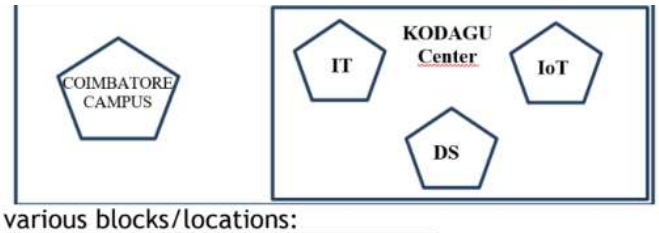


iv) a) Switch/Hub – In every block to interconnect the devices within every block
b) Router -In development block because server is going to be placed here

v) Satellite

3. Total-IT Corporation, a Karnataka based IT training company, is planning to set up training

centers in various cities in next 2 years. Their first campus is coming up in Kodagu district. At Kodagu campus, they are planning to have 3 different blocks, one for AI, IoT and DS (Data Sciences) each. Each block has number of computers, which are required to be connected in a network for communication, data and resource sharing. As a network consultant of this company, you have to suggest the best network related solutions for them for issues/problems raised in question nos. (i) to (v), keeping in mind the distances between various blocks/locations and other given parameters.



Distance between various blocks/locations:

Block	Distance
IT to DS	28 m
IT to IoT	55 m
DS to IoT	32 m
Kodagu Campus to Coimbatore Campus	304 km

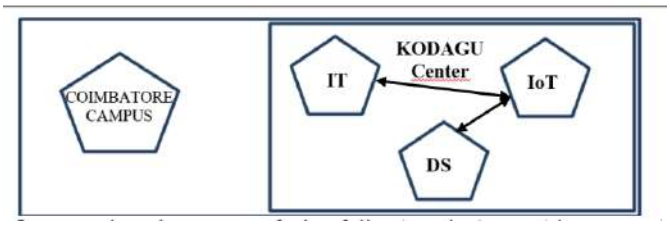
Number of computers:

Block	Number of Computers
IT	75
DS	50
IoT	80

(i) Suggest the most appropriate block/location to house the SERVER in the Kodagu campus (out of the 3 blocks) to get the best and effective connectivity. Justify your answer.
Ans: IoT block, as it has the maximum number of computers.

(ii) Suggest a device/software to be installed in the Kodagu Campus to take care of data security.
Ans:Firewall

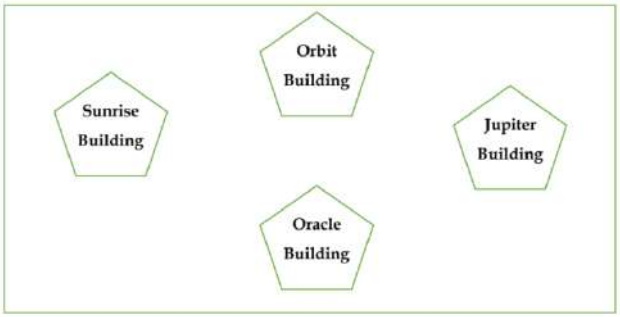
(iii) Suggest the best wired medium and draw the cable layout (Block toBlock) to most efficiently connect various blocks within the Kodagu Campus.
Ans:Optical fiber



(iv) Suggest the placement of the following devices with appropriate reasons:
a) Switch/Hub b) Router
Sol:a) Switch/Hub: In each block to interconnect the computers in that block.
b) Router: In IoT block (with the server) to interconnect all the three blocks.

(v) Suggest a protocol that shall be needed to provide Video Conferencing solution between Kodagu Campus and Coimbatore Campus.
Sol:VoIP

4. Aryan Infotech Solutions has set up its new center at Kamla Nagar for its office and web based activities. The company compound has 4 buildings as shown in the diagram below:



Distance between various buildings.	
Jupiter Building to Orbit Building	50 Mtrs
Orbit Building to Oracle Building	85 Mtrs.
Oracle Building to Sunrise Building	25 Mtrs.
Sunrise Building to Jupiter Building	170 Mtrs.
Jupiter Building to Oracle Building	125 Mtrs.
Orbit Building to Sunrise Building	45 Mtrs.

Number of Computers in each of the buildings is follows:	
Jupiter Building	30
Orbit Building	150
Oracle Building	15
Sunrise Building	35

i) Suggest a cable layout of connections between the buildings.

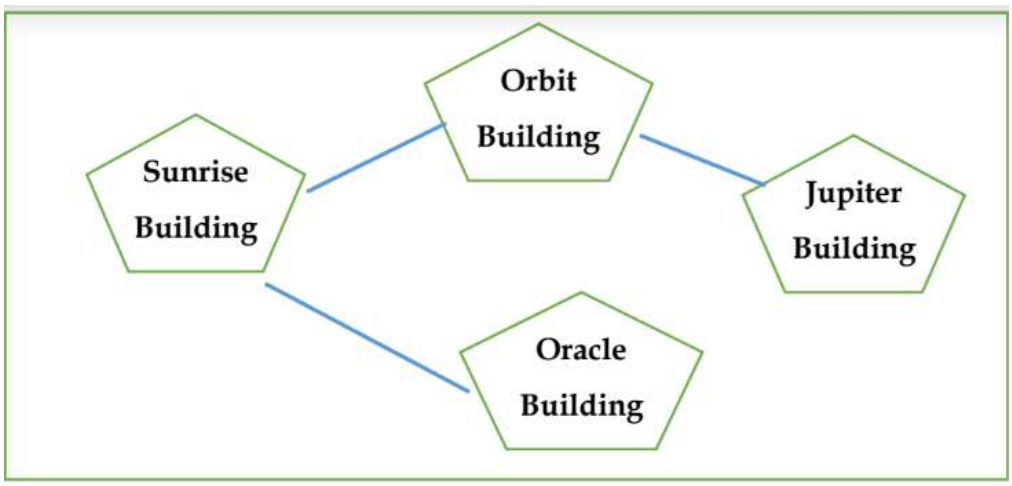
ii) Suggest the most suitable place (i.e. building) to house the server of this organisation with a
suitable reason

iii) Suggest the placement of the following devices with justification:
a. Internet Connecting Device/Modem
b. Switch

iv) The organisation is planning to link its sale 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.

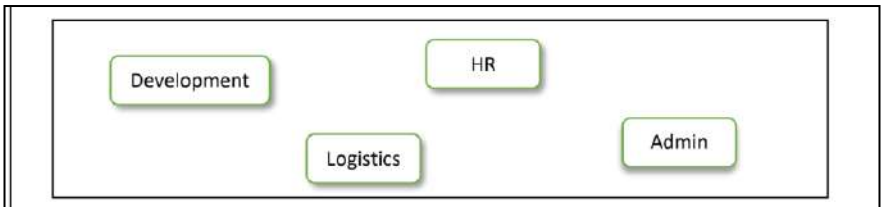
v) What do your mean by PAN? Explain giving example.

Sol: i)



ii) Orbit Building
iii) a. Internet Connecting Device/Modem- Orbit Building
b. Switch- Each Building
iv) MAN, it is formed to connect various locations of the city via various communication media.
v) PAN is “Personal Area Network”, basically configured at home area.

5. Magnolia Infotech wants to set up their computer network in the Bangalorebased campus having four
buildings. Each block has a number of computers that are required to be connected for ease of communication, resource sharing and data security. You are required to suggest the best answers to
the questions i) to v) keeping in mind the building layout on the campus.



Number of Computers.

Block	Number of computers
Development	100
HR	120
Admin	200
Logistics	110

Distance Between the various blocks

Block	Distance
Development to HR	50m
Development to Admin	75m
Development to Logistics	120m
HR to Admin	110m
HR to Logistics	50m
Admin to Logistics	140m

i) Suggest the most appropriate block to host the Server. Also justify your choice.

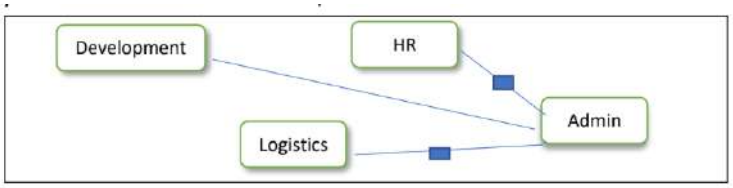
ii) Suggest the device that should should be placed in the Server building so that they can connect to Internet Service Provider to avail Internet Services.

iii) Suggest the wired medium and draw the cable block to block layout to economically connect the various blocks.

iv) Suggest the placement of Switches and Repeaters in the network with justification.

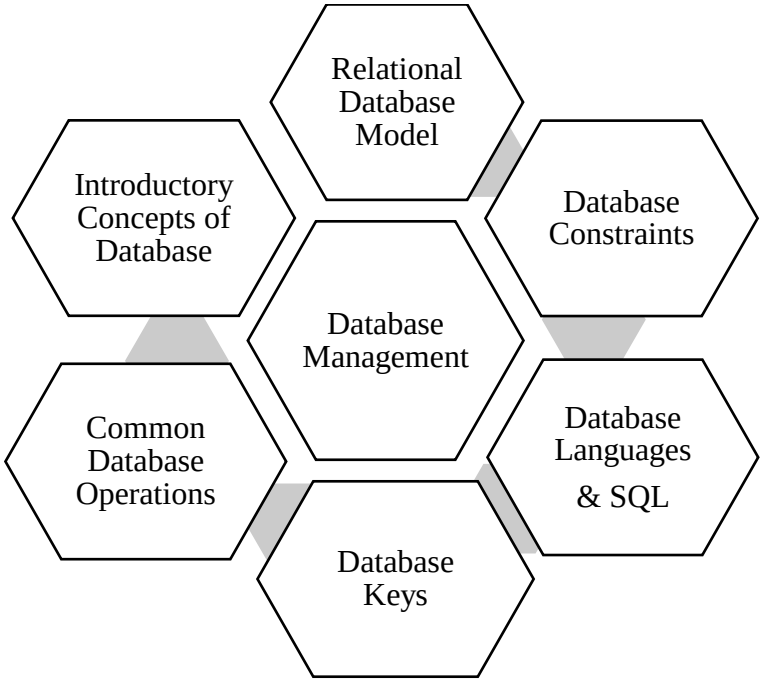
v) Suggest the high-speed wired communication medium between Bangalore Campus and Mysore campus to
establish a data network.

Sol: i) Admin Block since it has maximum number of computers.
ii) Modem should be placed in the Server building
iii) The wired medium is UTP/STP cables.

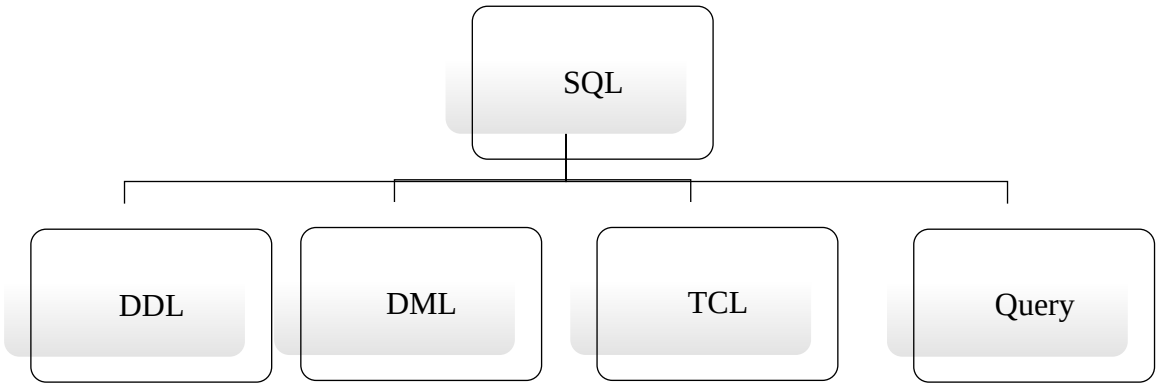


iv) Switches in all the blocks since the computers need to be connected to the network. Repeaters between Admin and HR block& Admin and Logistics block. The reason being the distance is more than 100m.
v) Optical Fiber cable connection.

Unit : 3 Database Management and Mysql



Structured Query Language (SQL)



Operations in SQL

SELECT		ALIAS		ORDER BY	
	MATHS OPERATION		RELATIONAL OPS		LOGIC OPS
IN / NOT IN		IS / IS NOT		LIKE / NOT LIKE	
	DISTINCT		GROUP BY		HAVING
EQUI JOIN		NATURAL JOIN		CARTESIAN PRODUCT	

Database Management System (DBMS)

Common Terminologies related to database:

- **Data** -> Raw facts or figures
- **Database** -> A collection of interrelated data.
- **DBMS** -> A collection of files and a set of programs allowing users to access/modify these files are known as Database Management System.
- **Data Redundancy** - > Duplication of data.
- **Data Security** -> Protection of data against accidental/intentional disclosure to unauthorized person or unauthorized modification/destruction.
- **Data Privacy** -> Right of individual/organization to determine when/how/what information to be transmitted to others.

Need of using Database:

* Helps to store data in a structured manner
* Query in the Database (i.e. ask questions about the data)
* Sort and Manipulate Data in the Database
* Validate the Data Entered and check for inconsistencies
* Produce Flexible Reports

Advantage of using Database:

- Reduce data redundancy
- Control inconsistency
- Facilitates sharing of data
- Enforce standards
- Ensure data security
- Maintain integrity

Limitations of implementing Database:

⊗ Compromise of Security and Integrity without good control
⊗ Performance overhead
⊗ Extra hardware required sometimes
⊗ Complex system

Types of DBMS:

- Hierarchical DBMS
- Network Based DBMS
- Object Based DBMS
- Relational DBMS

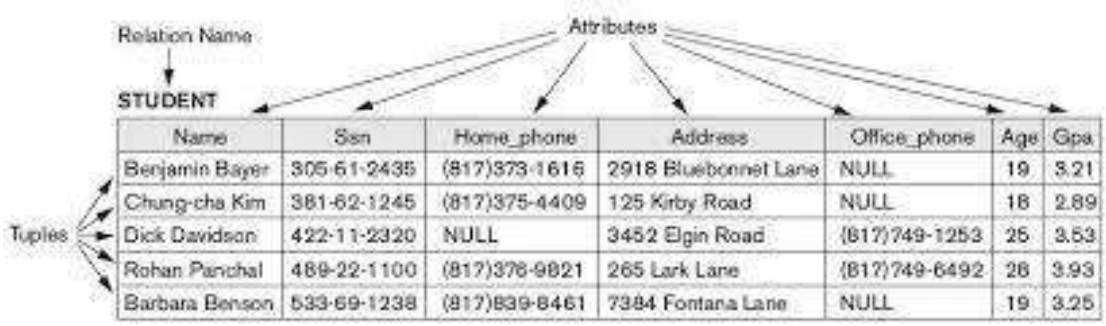
RELATIONAL DATA MODEL

Relational Data Model is defined as a model of defining a database as a collection of tables/relations i.e. arrangement of values in rows/tuples and columns/fields/attributes.

Common Terminologies related to Relational Data Model:

- **Relation**: Collection of data organized in rows and columns where each cell has atomic value. (same as Table)
- **Tuple**: Row of a table (same as Record)
- **Attribute**: Column of a table (same as Field)
- **Domain**: Range of values (data types) allowed for an attribute
- **Degree**: No. of attributes/columns/fields in a table
- **Cardinality**: No. of tuples/rows/records in a table
- **View**: Virtual table (no physical existence) derived from one or more base table for ease of query only.
- **Referential Integrity:** Property of database that requires every value of one attribute of a Relation must be present in another attribute (same datatype) in a different (or the same) relation.

Example:



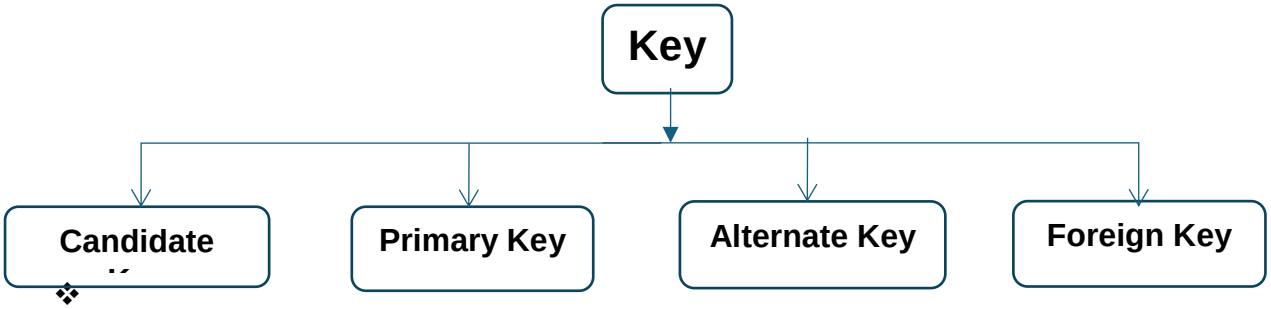
Name	Ssn	Home_phone	Address	Office_phone	Age	Gpa
Benjamin Bayer	305-61-2435	(817)373-1616	2918 Bluebonnet Lane	NULL	19	3.21
Chung-cha Kim	381-62-1245	(817)375-4409	125 Kirby Road	NULL	18	2.89
Dick Davidson	422-11-2320	NULL	3452 Elgin Road	(817)749-1253	25	3.53
Rohan Panchal	489-22-1100	(817)376-9821	265 Lark Lane	(817)749-6492	28	3.93
Barbara Benson	533-69-1238	(817)839-8461	7384 Fontana Lane	NULL	19	3.25

In the above table STUDENT, degree = 7 and cardinality = 5.

Database Key

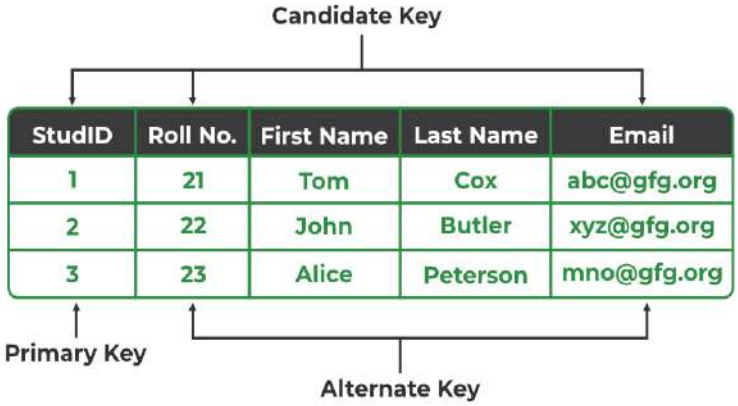
Key in a database is defined as a set of attributes to identify each record uniquely in a table. A Key must be unique and not null.

Classification of Keys:



- **Candidate Key:** Candidate key is defined as a set of minimum no. of attributes to uniquely identify a record in a table. A table may have multiple candidate keys.
- **Primary Key:** The one candidate key chosen by Database Administrator for a table to uniquely identify a record in a table is said to be Primary Key of that table. A table can have exactly one Primary Key.
- **Alternate Key:** Candidate key(s) not chosen by Database Administrator in a table is/are defined as alternate key(s). A table can have 0 or more alternate keys.

❖ **Foreign Key:** Foreign Key is a non-key attribute derived from primary key of some other table. A table can have 0 or more foreign keys.



Student_Details:

Roll No.	Name	Course_Id
1	Aryan	101
2	Sachin	102
3	Prince	103

FOREIGN KEY

Student_Marks:

PRIMARY KEY

Course_Id	Gpa
101	3
102	4
103	2.5

Data types in SQL

- Numeric data types: Used for representing number in a column
  e.g. –
  int(m) – Integer of maximum length m i.e. maximum number of digits allowed in m.
  float(m,d), decimal (m,d), numeric(m,d) – Real number of maximum length m where maximum number of digits permissible after decimal point is d and before decimal point is m-d.

- Date & Time data types: Used to represent date, time, or both in a column. Data is enclosed with quotes ‘ ’ or “ “.
  e.g. - **date, datetime, time**

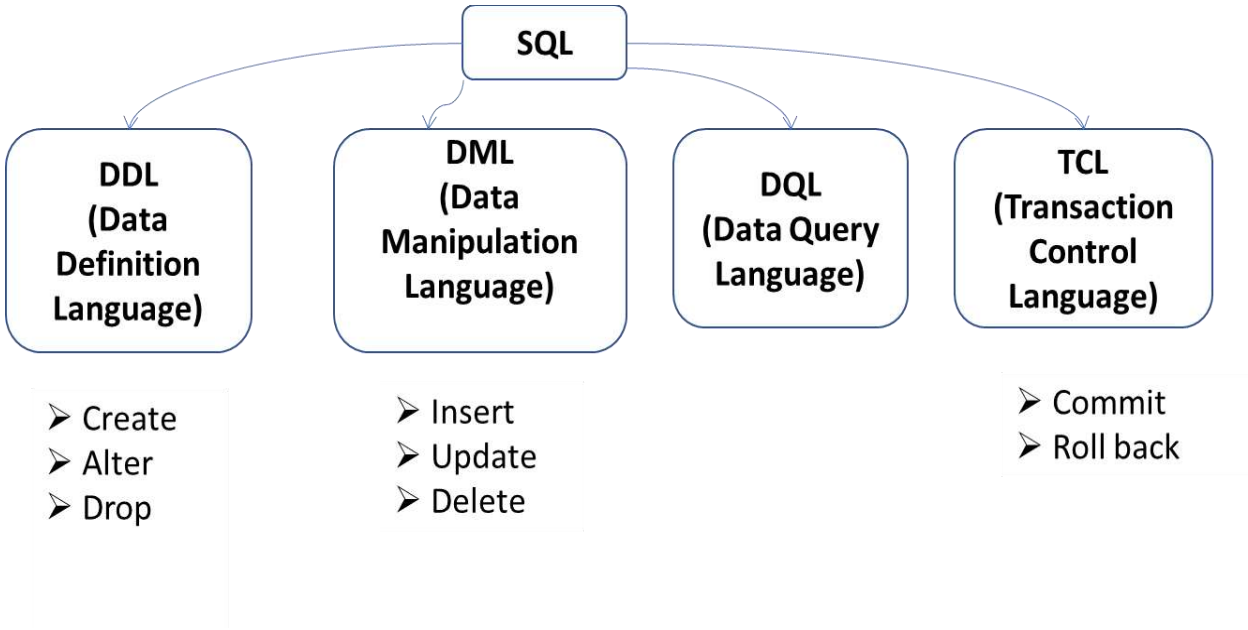
- String / Text data types: Used to represent text in a column. Data is enclosed with quotes ‘ ’ or “ “.
  e.g. –
  char(m) – Fixed length character of length m where 1 character takes 1 Byte in memory. Memory space is wasted if text size is less than m.

varchar(m) – Variable length character allowing maximum number of characters m. It saves memory allocation for text having lesser size than m.

blob – Binary Large object for huge size text.

* **NULL** – NULL is said to be the absence of any value in a column. No arithmetic or comparison operation can be performed on NULL value.

Classification of Database Language



Data Definition Language (DDL):

Data Definition Language (DDL) defines the different structures in a database like table, view, index etc.

DDL statements are used to create structure of a table, modify the existing structure of the table and remove the existing table.

e.g. - CREATE, ALTER, DROP

Syntax of DDL statements:

- CREATE TABLE table_name
  (column_name datatype constraint)
- ALTER TABLE table_name
  ADD column datatype constraint (if any)
  MODIFY column new_datatype new_constraint (if any)
  DROP column
- DROP TABLE table_name

Data Manipulation Language (DML):

Data Manipulation Language (DML) statements are used to access and manipulate

data in existing tables.

The manipulation includes inserting data into tables, deleting data from the tables and modifying the existing data.

e.g. – INSERT, UPDATE, DELETE

Types of DML statements:

- INSERT record

  INSERT INTO table_name(columns) VALUES (1 or more comma separated values)

- UPDATE one or more columns in already existing record(s)

  UPDATE table_name SET column = value or expression

  (comma separated if multiple columns updated) WHERE condition

- DELETE record

  DELETE FROM table_name WHERE condition

Transaction Control Language (TCL):

Database ensures that a database transaction i.e. complete set of records involved in a transaction either fully completed or not taken place at all to maintain data consistency. Transaction Control Language (TCL) statements allows to save or revert database transactions.

e.g. –

COMMIT – Save the changes permanently in the database

ROLL BACK – Revert back the changes made in database

Query:

Query is a type of SQL commands which accepts tables (relations), columns (fields or attributes) and conditions or specifications if any and display the output by means of a temporary table which consists of data represented through fields and records.

Structure of Query:

SELECT < 1, multiple (comma i.e. , separated) or all columns >

FROM < 1 table or multiple tables (comma i.e. , separated) in case of join >

WHERE <condition on column(s)>

GROUP BY <1 column>

HAVING < condition on aggregate function on a column only if group by exists >

ORDER BY <0, 1 or more (comma i.e. , separated) columns >

Note:

I. Among above SELECT and FROM are mandatory statements in a query and all other statements are optional.

II. SELECT statement contains one or more columns. * should be used to display all columns. Functions or expressions on columns can also be done.

III. FROM statement contains multiple tables only if columns from more than one tables are displayed through SELECT statement in case of product or join operations. Here records can be fetched from multiple tables.

IV. WHERE clause may contain multiple conditions related with logical OR / AND operators. Logical NOT operator can be used on a condition also.

V. GROUP BY clause is used if statistical records are to be displayed based on a field/column. In this case SELECT statements should contain GROUP BY field and aggregate function on another column at least. Once a group is formed individual records cannot be accessed in the same query.

VI. ORDER BY clause can be used to arrange the output records in ascending (by default) or descending order of values in one or more columns.

Order of execution of a query

Step 1: Identify table(s) with FROM clause

Step 2: Filter records using WHERE clause

Step 3: Form group if any using GROUP BY clause

Step 4: Filter groups using HAVING clause only if GROUP BY is used

Step 5: Arrange the output records in ascending or descending order using ORDER BY

Step 6: Display the fields mentioned in SELECT clause.

Database Constraints

Rules imposed on the values of one or more columns in the tables are called database constraints.

The database constraints are:

UNIQUE	Ensures that all values in a column are different. No two records have same values in that column.
NOT NULL	Ensures that a column can never have NULL values.
PRIMARY KEY	Uniquely identify a record. It is a combination of UNIQUE and NOT NULL.
CHECK	Specify the domain of values with certain criteria for a column.
DEFAULT	Provides default value for a column when no value is specified.
REFERENCES / FOREIGN KEY	Ensures referential integrity between the foreign key of dependent / referencing table and primary key of independent / referenced table.

SQL STATEMENTS WITH EXAMPLES

Create two tables EMPL and DEPT as follows:

Table : DEPT

DEPT_ID	DNAME	DLOC	MAX_STRENGTH
D01	FINANCE	MUMBAI	20
D02	ADMIN	KOLKATA	15
D03	IT	CHENNAI	5

Table : EMPL

EID	ENAME	GEN	DOJ	HOMETOWN	SALARY	MGR_ID	DEPT_ID
E0001	RITU SEN	F	20/06/2002	KOLKATA	40000.00		D03
E0002	MALCOM RAY	M	12/11/1998	BANGALORE	50000.00		D02
E0003	SUNDAR P	M	9/12/2008	BANGALORE	40000.00		D01
E0004	ANISHA RAWAT	F	4/09/2019	DELHI	20000.00	E0001	D03
E0005	SANA KHAN	F	31/08/2017	DELHI	30000.00	E0003	D01

In DEPT table:

1. DEPT_ID is primary key
2. DNAME is not null
3. MAX_STRENGTH should be minimum 1

In EMPL table:

1. EID is primary key
2. ENAME is not null
3. HOMETOWN is 'BANGALORE' by default
4. SALARY is between 5000.00 and 300000.00
5. MGR_ID refers to EID of manager
6. DEPT_ID refers to DEPT_ID of table DEPT

A. Write DDL statement to create a database OFFICE and define two tables mentioned as above under OFFICE database.

Create new database OFFICE in MySQL as following:

CREATE DATABASE OFFICE;

Work inside the database OFFICE as following:

USE OFFICE;

Note: By default, TEST database is used which is in-built database in MySQL. So no need to create test. Only 'use test;' statement can be written to enter test.

DDL statement to create DEPT table is as following:

SOLUTION 1	SOLUTION 2
CREATE TABLE DEPT **(** **DEPT_ID VARCHAR(4) PRIMARY KEY,** **DNAME VARCHAR(15) NOT NULL,** **DLOC VARCHAR(20),** **MAX_STRENGTH INT(2) CHECK (MAX_STRENGTH >= 1)** **);**	**CREATE TABLE DEPT** **(** **DEPT_ID VARCHAR(4),** **DNAME VARCHAR(15) NOT NULL,** **DLOC VARCHAR(20),** **MAX_STRENGTH INT(2),** **PRIMARY KEY(DEPT_ID),** **CHECK (MAX_STRENGTH >= 1)** **);**

Schema or structure of table DEPT is as follows:

DESC DEPT;

Field	Type	Null	Key	Default	Extra
DEPT_ID	varchar(4)	NO	PRI	NULL	
DNAME	varchar(15)	NO		NULL	
DLOC	varchar(20)	YES		NULL	
MAX_STRENGTH	int(2)	YES		NULL	

DDL statement to create EMPL table is as following:

```
CREATE TABLE EMPL
(
EID VARCHAR(6) PRIMARY KEY,
ENAME VARCHAR(30) NOT NULL,
GEN CHAR(1) CHECK (GEN IN ('M', 'F', 'T')),
DOJ DATE,
HOMETOWN VARCHAR(20) DEFAULT 'BANGALORE',
SALARY DECIMAL(8, 2) CHECK (SALARY BETWEEN 5000 AND 300000),
MGR_ID VARCHAR(6) REFERENCES EMPL(EID),
DEPT_ID VARCHAR(4) REFERENCES DEPT(DEPT_ID)
);
```

or,

```
CREATE TABLE EMPL
(
        EID VARCHAR(6),
        ENAME VARCHAR(30) NOT NULL,
        GEN CHAR,
        DOJ DATE,
        HOMETOWN VARCHAR(20) DEFAULT 'BANGALORE',
        SALARY DECIMAL(8, 2) ,
        MGR_ID VARCHAR(6) ,
        DEPT_ID VARCHAR(4) ,
        PRIMARY KEY(EID),
        CHECK (GEN IN ('M', 'F', 'T')),
        CHECK (SALARY BETWEEN 5000.00 AND 300000.00),
        FOREIGN KEY(MGR_ID) REFERENCES EMPL(EID),
        FOREIGN KEY(DEPT_ID) REFERENCES DEPT(DEPT_ID)
);
```

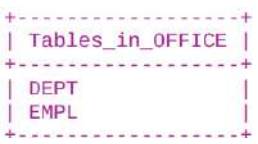
Schema or structure of table EMPL is as follows:

DESC EMPL;

Field	Type	Null	Key	Default	Extra
EID	varchar(6)	NO	PRI	NULL	
ENAME	varchar(30)	NO		NULL	
GEN	char(1)	YES		NULL	
DOJ	date	YES		NULL	
HOMETOWN	varchar(20)	YES		BANGALORE	
SALARY	decimal(8,2)	YES		NULL	
MGR_ID	varchar(6)	YES	MUL	NULL	
DEPT_ID	varchar(4)	YES	MUL	NULL	

Name of tables defined in current database so far.

SHOW TABLES;



```
+-----------------+
| Tables_in_OFFICE |
+-----------------+
| DEPT            |
| EMPL            |
+-----------------+
```

B. Write DML statements to insert records in two tables.

DML statements to insert records in DEPT are as follows:

INSERT INTO DEPT VALUES ('D01', 'FINANCE', 'MUMBAI', 20);

INSERT INTO DEPT VALUES ('D02', 'ADMIN', 'KOLKATA', 15);

INSERT INTO DEPT VALUES ('D03', 'IT', 'CHENNAI', 5);

DML statements to insert records in EMPL are as follows:

INSERT INTO EMPL VALUES ('E0001', 'RITU SEN', 'F', '2002-06-20', 'KOLKATA', 40000.00, NULL, 'D03');

INSERT INTO EMPL VALUES ('E0002', 'MALCOM RAY', 'M', '1998-11-12', 'BANGALORE', 50000.00, NULL, 'D02');

INSERT INTO EMPL(EID, ENAME, GEN, DOJ, HOMETOWN, SALARY, DEPT_ID) VALUES ('E0003', 'SUNDAR P', 'M', '2008-12-09', 'BANGALORE', 40000.00, 'D01');

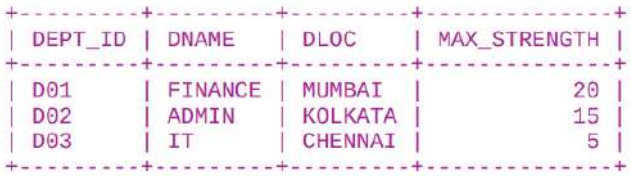
INSERT INTO EMPL VALUES ('E0004', 'ANISHA RAWAT', 'F', '2019-09-04', 'DELHI', 20000.00, 'E0001', 'D03');

INSERT INTO EMPL VALUES ('E0005', 'SANA KHAN', 'F', '2017-08-31', 'DELHI', 30000.00, 'E0003', 'D01');

C. Write SQL statements for the following queries and display their outputs.

1. Display all the records from table DEPT.

SELECT * FROM DEPT;



```
+---------+---------+---------+--------------+
| DEPT_ID | DNAME   | DLOC    | MAX_STRENGTH |
+---------+---------+---------+--------------+
| D01     | FINANCE | MUMBAI  |           20 |
| D02     | ADMIN   | KOLKATA |           15 |
| D03     | IT      | CHENNAI |            5 |
+---------+---------+---------+--------------+
```

2. Display name and salary of all the employeEs from table EMPL.

SELECT ENAME, SALARY
FROM EMPL;

ENAME	SALARY
RITU SEN	40000.00
MALCOM RAY	50000.00
SUNDAR P	40000.00
ANISHA RAWAT	20000.00
SANA KHAN	30000.00

4. Display DNAME in ascending order of MAX_STRENGTH.

SOLUTION 1	SOLUTION 2	OUTPUT
SELECT DNAME FROM DEPT ORDER BY MAX_STRENGTH;	**SELECT DNAME FROM DEPT ORDER BY MAX_STRENGTH ASC;**	DNAME IT ADMIN FINANCE

Note:

- ✓ Sorting in SQL is by default in ascending order of values be it numeric or alphabetical order. Hence ASC is default keyword and need not be used in ORDER BY statement.
- ✓ In case of arranging the output of query in descending order of values DESC keyword must be used in ORDER BY statement.

Comparison operators

= > < >= <= <> !=

4. Display name and gender of employees whose hometown is BANGALORE.

SOLUTION	OUTPUT
SELECT ENAME, GEN FROM EMPL WHERE HOMETOWN = 'BANGALORE';	ENAME | GEN MALCOM RAY | M SUNDAR P | M

5. Display the name of departments which are not located in KOLKATA.

SOLUTION 1	SOLUTION 2	OUTPUT
SELECT DNAME FROM DEPT WHERE DLOC <> KOLKATA';	**SELECT DNAME FROM DEPT WHERE DLOC != 'KOLKATA';**	DNAME FINANCE IT

6. Display name of employees and salary in descending order of names where DEPT_ID is not 'D03'.

SOLUTION	OUTPUT

SELECT ENAME, SALARY FROM EMPL WHERE DEPT_ID != 'D03' ORDER BY ENAME DESC;	+------------+----------+ | ENAME | SALARY | +------------+----------+ | SUNDAR P | 40000.00 | | SANA KHAN | 30000.00 | | MALCOM RAY | 50000.00 | +------------+----------+

7. Display EID, ENAME of employees whose DOJ is after January, 2015.

SOLUTION	OUTPUT
SELECT EID, ENAME FROM EMPL WHERE DOJ > '2015-01-31' ;	+-------+--------------+ | EID | ENAME | +-------+--------------+ | E0004 | ANISHA RAWAT | | E0005 | SANA KHAN | +-------+--------------+

[Note: DATE should be preferably mentioned in 'yyyy-mm-dd' format.]

Logical Operators

OR AND NOT

Logical operators are used in where clause. AND, OR are binary operations which require 2 conditions. NOT is unary operator which requires one condition only.

- **AND** : c1 and c2 → If both c1 and c2 are true the overall condition is true.
- **OR** : c1 or c2 → If at least one between c1 or c2 are true the overall condition is true.
- **NOT** : not c1 → If c1 is true the overall condition is false and vice versa.

BETWEEN: BETWEEN operator can be used as a substitute of and operation where the minimum and maximum value is to be checked for a single column.

8. Display the records of those employees whose salary is between 35000 and 45000.

SOLUTION1	SOLUTION2
SELECT * FROM EMPL WHERE SALARY >=35000 AND SALARY <=45000;	**SELECT * FROM EMPL WHERE SALARY BETWEEN 35000 AND 45000;**

```
+-------+----------+------+------------+-----------+----------+--------+---------+
| EID   | ENAME    | GEN  | DOJ        | HOMETOWN  | SALARY   | MGR_ID | DEPT_ID |
+-------+----------+------+------------+-----------+----------+--------+---------+
| E0001 | RITU SEN | F    | 2002-06-20 | KOLKATA   | 40000.00 | NULL   | D03     |
| E0003 | SUNDAR P | M    | 2008-12-09 | BANGALORE | 40000.00 | NULL   | D01     |
+-------+----------+------+------------+-----------+----------+--------+---------+
```

Checking a list of values

IN: IN operator is a substitute of OR operation(s) among equality checking of a single column with multiple values.

NOT IN: NOT IN operator is used for non-equality checking of a column with multiple values.

9. Display name and hometown of employees who belong to departments 'D01' or 'D02'.

SOLUTION 1	SOLUTION 2	OUTPUT
SELECT ENAME, HOMETOWN FROM EMPL WHERE DEPT_ID = 'D01' OR DEPT_ID = 'D02';	**SELECT ENAME, HOMETOWN FROM EMPL WHERE DEPT_ID IN ('D01', 'D02');**	+-----------+----------+ | ENAME | HOMETOWN | +-----------+----------+ | MALCOM RAY | BANGALORE | | SUNDAR P | BANGALORE | | SANA KHAN | DELHI | +-----------+----------+

10. Display EID and SALARY of employees whose half of salary is neither 10000 nor 20000.

SOLUTION 1	SOLUTION 2	OUTPUT
SELECT EID, SALARY FROM EMPL WHERE NOT (SALARY/2 = 10000 OR SALARY/2 = 20000);	**SELECT EID, SALARY FROM EMPL WHERE SALARY/2 NOT IN (10000, 20000);**	+-------+----------+ | EID | SALARY | +-------+----------+ | E0002 | 50000.00 | | E0005 | 30000.00 | +-------+----------+

Wildcard Characters

A string constant to be checked with a value stored in a column may have one or more characters missing in case of sub string checking. Such placeholder can be of two types:

_ → Replacement or placeholder of exactly one character in the string constant value. (underscore)

% → Replacement or placeholder of 0 or more characters in the string constant value.

LIKE: A string constant containing one or more wildcard characters can be checked for equality with LIKE operator only, not =.

NOT LIKE: Likewise NOT LIKE operator checks inequality checking with a string constant containing one or more wildcard characters. It cannot be done using <> or !=.

11. List the name of employees whose name starts with 'S' and have length at least 5.

SOLUTION	OUTPUT
SELECT ENAME FROM EMPL WHERE ENAME LIKE 'S____%'; **[Hints: 4 underscores i.e. _ after S]**	+-----------+ | ENAME | +-----------+ | SUNDAR P | | SANA KHAN | +-----------+

12. List the name of employees whose name ends with 'N' or does not contain 'M' in it.

SOLUTION	OUTPUT
SELECT ENAME **FROM EMPL** **WHERE ENAME LIKE '%N'** **AND ENAME NOT LIKE '%M%';**	+-----------+ | ENAME | +-----------+ | RITU SEN | | SANA KHAN | +-----------+

NULL checking

IS: IS is a special operator which is used to check absence of value i.e. NULL in a column as no other comparison operator can be used on NULL values.

IS NOT: Likewise, IS NOT is used to check the presence of values i.e. NOT NULL in a column.

13. Print ENAME and DEPT_ID of employees who do not have manager i.e. MGR_ID is blank.

SOLUTION	OUTPUT
SELECT ENAME, DEPT_ID **FROM EMPL** **WHERE MGR_ID IS NULL;**	+------------+---------+ | ENAME | DEPT_ID | +------------+---------+ | RITU SEN | D03 | | MALCOM RAY | D02 | | SUNDAR P | D01 | +------------+---------+

14. Print ENAME and DEPT_ID of employees who have manager i.e. MGR_ID is not empty.

SOLUTION	OUTPUT
SELECT ENAME, DEPT_ID **FROM EMPL** **WHERE MGR_ID IS NOT NULL;**	+--------------+---------+ | ENAME | DEPT_ID | +--------------+---------+ | ANISHA RAWAT | D03 | | SANA KHAN | D01 | +--------------+---------+

Display redundant or unique values

ALL: ALL keyword allows all the values occurring including duplicate values to be displayed in output. SQL allows duplicate values in output. ALL is by default used in SQL, so need not be used explicitly.

DISTINCT: By default, SQL does not remove any duplicate values in the output on its own. Hence DISTINCT keyword is used along with a column where redundant values need to be removed before displayed.

15. List the hometowns of all the employee (Including duplicate values).

SOLUTION 1	SOLUTION 2	OUTPUT
SELECT HOMETOWN FROM EMPL;	**SELECT ALL HOMETOWN FROM EMPL;**	+----------+ | HOMETOWN | +----------+ | KOLKATA | | BANGALORE | | BANGALORE | | DELHI | | DELHI | +----------+

16. List the name of places which are hometown of any employee. (No duplicate values)

SOLUTION	OUTPUT
SELECT DISTINCT HOMETOWN FROM EMPL;	+----------+ | HOMETOWN | +----------+ | KOLKATA | | BANGALORE | | DELHI | +----------+

Aggregate functions

SUM( ) AVG( ) MAX( ) MIN( ) COUNT( )

Aggregate or statistical functions can be used on a group of records.

Using GROUP BY clause: Display outputs regarding each group formed by the GROUP BY field.

Without using GROUP BY clause: Display output corresponding to the overall table may or may not be filtered by where clause.

For example, consider the following ITEM table:

ITEM_NAME	PRICE	TYPE
RICE	60	Crops
WHEAT	45	Crops
TEA		Leaves
RAJMA	300	Pulses

Functions	Query	Output	Explanation
SUM()	SELECT SUM(PRICE) FROM ITEM	405	60 + 45 + 300 = 405
AVG()	SELECT AVG(PRICE) FROM ITEM	135	(60 + 45 + 300) / 3 = 135
MAX()	SELECT MAX(PRICE) FROM ITEM	300	Maximum among 60, 45, 300 = 300
MIN()	SELECT MIN(PRICE) FROM ITEM	45	Minimum among 60, 45, 300 = 45
COUNT()	SELECT COUNT(PRICE) FROM ITEM SELECT COUNT(*) FROM ITEM	3 4	Number of records in output

GROUP BY: GROUP BY clause is used if statistical records of a table are to be displayed based on a field. Once the group is formed individual records cannot be accessed in that query. Several clusters or groups are formed based on the number of different values in the GROUP BY column present in the table.

For example, if GROUP BY is applied on TYPE field of ITEM table 3 groups are formed – Crops have 2 records, Leaves and Pulses have one record each.

Renaming field and table

AS is an optional keyword to rename a column a table in FROM clause or an expression on column(s) in SELECT clause. If there is blank space in alias then it must be surrounded by ' ' or " ".

- Column renaming is done for customized display of query output.
- Table renaming is done for giving convenient names to the tables in join operations for ease of access by programmers.

17. Display the number of distinct DLOC mentioned in table DEPT.

SOLUTION	OUTPUT
SELECT COUNT(DISTINCT DLOC) as 'NO. OF LOCATIONS' **FROM DEPT;**	+------------------+ | NO. OF LOCATIONS | +------------------+ | 3 | +------------------+

18. Display the earliest and latest DOJ of employees as per EMPL.

SOLUTION	OUTPUT
SELECT MIN(DOJ) 'EARLIEST', MAX(DOJ) 'LATEST' **FROM EMPL;**	+------------+------------+ | EARLIEST | LATEST | +------------+------------+ | 1998-11-12 | 2019-09-04 | +------------+------------+

19. Display the number of employees of each gender GEN.

SOLUTION	OUTPUT
SELECT GEN, COUNT(*) COUNT **FROM EMPL** **GROUP BY GEN;**	+------+-------+ | GEN | COUNT | +------+-------+ | F | 3 | | M | 2 | +------+-------+

20. Display the total SALARY paid by each department.

SOLUTION	OUTPUT
SELECT DEPT_ID, SUM(SALARY) 'TOTAL SALARY' **FROM EMPL** **GROUP BY DEPT_ID;**	+---------+--------------+ | DEPT_ID | TOTAL SALARY | +---------+--------------+ | D01 | 70000.00 | | D02 | 50000.00 | | D03 | 60000.00 | +---------+--------------+

HAVING: It is a conditional statement used along with group by clause only. It compares the values with the outcome of aggregate functions belonging to each group already formed by GROUP BY clause.

Difference between WHERE and HAVING:

WHERE	HAVING
Works on the entire table	Works on the groups formed by GROUP BY
Checks all records individually and filter the output	Checks the output of aggregate functions on each group and filter groups

21. Display the hometowns and no. of employees belonging to them if the headcount per hometown is at least 2.

SOLUTION	OUTPUT
SELECT HOMETOWN, COUNT(EID) 'NO OF EMPLOYEE' **FROM EMPL** **GROUP BY HOMETOWN** **HAVING COUNT(EID) >= 2;**	+-----------+----------------+ | HOMETOWN | NO OF EMPLOYEE | +-----------+----------------+ | BANGALORE | 2 | | DELHI | 2 | +-----------+----------------+

22. Display the number of employees working in each DEPT_ID excepting 'D01' where no. of employees in the DEPT_ID is more than 1.

SOLUTION	OUTPUT
SELECT DEPT_ID, COUNT(*) AS 'NO OF EMPLOYEE' **FROM EMPL** **WHERE DEPT_ID != 'D01'** **GROUP BY DEPT_ID** **HAVING COUNT(*) > 1;**	+---------+----------------+ | DEPT_ID | NO OF EMPLOYEE | +---------+----------------+ | D03 | 2 | +---------+----------------+

Cartesian Product

Cartesian product is performed on two tables and it produces all the combination of records in both tables. It does not require any common column.

If tables A, B have m, n columns and p, q records respectively then resultant table A x B has m+n columns and p x q records.

23. Perform Cartesian Product between EMPL and DEPT.

SOLUTION 1	SOLUTION 2	SOLUTION 3
SELECT * **FROM EMPL, DEPT;** [RECOMMENDED STATEMENT]	**SELECT *** **FROM EMPL INNER JOIN DEPT;**	**SELECT *** **FROM EMPL JOIN DEPT;**

EID	ENAME	GEN	DOJ	HOMETOWN	SALARY	MGR_ID	DEPT_ID	DEPT_ID	DNAME	DLOC	MAX_STRENGTH
E0001	RITU SEN	F	2002-06-20	KOLKATA	40000.00	NULL	D03	D01	FINANCE	MUMBAI	20
E0001	RITU SEN	F	2002-06-20	KOLKATA	40000.00	NULL	D03	D02	ADMIN	KOLKATA	15
E0001	RITU SEN	F	2002-06-20	KOLKATA	40000.00	NULL	D03	D03	IT	CHENNAI	5
E0002	MALCOM RAY	M	1998-11-12	BANGALORE	50000.00	NULL	D02	D01	FINANCE	MUMBAI	20
E0002	MALCOM RAY	M	1998-11-12	BANGALORE	50000.00	NULL	D02	D02	ADMIN	KOLKATA	15
E0002	MALCOM RAY	M	1998-11-12	BANGALORE	50000.00	NULL	D02	D03	IT	CHENNAI	5
E0003	SUNDAR P	M	2008-12-09	BANGALORE	40000.00	NULL	D01	D01	FINANCE	MUMBAI	20
E0003	SUNDAR P	M	2008-12-09	BANGALORE	40000.00	NULL	D01	D02	ADMIN	KOLKATA	15
E0003	SUNDAR P	M	2008-12-09	BANGALORE	40000.00	NULL	D01	D03	IT	CHENNAI	5
E0004	ANISHA RAWAT	F	2019-09-04	DELHI	20000.00	E0001	D03	D01	FINANCE	MUMBAI	20
E0004	ANISHA RAWAT	F	2019-09-04	DELHI	20000.00	E0001	D03	D02	ADMIN	KOLKATA	15
E0004	ANISHA RAWAT	F	2019-09-04	DELHI	20000.00	E0001	D03	D03	IT	CHENNAI	5
E0005	SANA KHAN	F	2017-08-31	DELHI	30000.00	E0003	D01	D01	FINANCE	MUMBAI	20
E0005	SANA KHAN	F	2017-08-31	DELHI	30000.00	E0003	D01	D02	ADMIN	KOLKATA	15
E0005	SANA KHAN	F	2017-08-31	DELHI	30000.00	E0003	D01	D03	IT	CHENNAI	5

JOIN

NATURAL JOIN: Natural join is a binary operator which works on two tables. They should have one column which have same name and domain. It a combination of Cartesian product and a where clause with equality checking on the common columns.

- Other conditions in that query are ANDed with the join condition.
- Natural join is mostly done on Foreign key field of one table and Primary key field of another table.
- If tables A, B have m, n columns and p, q records respectively then resultant table has m+n columns and minimum(p,q) records.

EQUI JOIN: Equi join is a join operation which works on the equality condition of values in two columns from two tables having similar data type. NATURAL JOIN, EQUI JOIN are said to be INNER JOIN.

24. Perform Natural Join between these two tables.

SOLUTION 1	SOLUTION 2
SELECT * FROM EMPL NATURAL JOIN DEPT;	**SELECT * FROM EMPL, DEPT WHERE EMPL.DEPT_ID = DEPT.DEPT_ID;** [RECOMMENDED STATEMENT]

EID	ENAME	GEN	DOJ	HOMETOWN	SALARY	MGR_ID	DEPT_ID	DEPT_ID	DNAME	DLOC	MAX_STRENGTH
E0001	RITU SEN	F	2002-06-20	KOLKATA	40000.00	NULL	D03	D03	IT	CHENNAI	5
E0002	MALCOM RAY	M	1998-11-12	BANGALORE	50000.00	NULL	D02	D02	ADMIN	KOLKATA	15
E0003	SUNDAR P	M	2008-12-09	BANGALORE	40000.00	NULL	D01	D01	FINANCE	MUMBAI	20
E0004	ANISHA RAWAT	F	2019-09-04	DELHI	20000.00	E0001	D03	D03	IT	CHENNAI	5
E0005	SANA KHAN	F	2017-08-31	DELHI	30000.00	E0003	D01	D01	FINANCE	MUMBAI	20

25. Display every ENAME and their corresponding DNAME.

SOLUTION	OUTPUT
SELECT ENAME, DNAME FROM EMPL, DEPT WHERE EMPL.DEPT_ID = DEPT.DEPT_ID;	ENAME | DNAME RITU SEN | IT MALCOM RAY | ADMIN SUNDAR P | FINANCE ANISHA RAWAT | IT SANA KHAN | FINANCE

26. List the name of employees who work in ADMIN department.

SOLUTION	OUTPUT
SELECT ENAME FROM EMPL AS E, DEPT AS D WHERE E.DEPT_ID = D.DEPT_ID AND DNAME = 'ADMIN';	ENAME MALCOM RAY

27. Display no. of employees working in those departments whose DLOC is CHENNAI.

SOLUTION	OUTPUT

SELECT COUNT(*) 'NO. OF EMPLOYEES' FROM EMPL AS E, DEPT AS D WHERE E.DEPT_ID = D.DEPT_ID AND DLOC = 'CHENNAI';	+------------------+ | NO. OF EMPLOYEES | +------------------+ | 2 | +------------------+

28. Display ENAME of employees who have manager along with that display ENAME of their corresponding manager as well.

SOLUTION	OUTPUT
SELECT E.ENAME 'EMPLOYEE', M.ENAME 'MANAGER' FROM EMPL E, EMPL M WHERE E.MGR_ID = M.EID;	+---------------+----------+ | EMPLOYEE | MANAGER | +---------------+----------+ | ANISHA RAWAT | RITU SEN | | SANA KHAN | SUNDAR P | +---------------+----------+

29. Display ENAME and the amount of bonus to be paid to that employee where bonus = 5000 + 5% of SALARY.

SOLUTION	OUTPUT
SELECT ENAME, SALARY, 5000 + 0.05 * SALARY 'BONUS' FROM EMPL;	+---------------+----------+------------+ | ENAME | SALARY | BONUS | +---------------+----------+------------+ | RITU SEN | 40000.00 | 7000.0000 | | MALCOM RAY | 50000.00 | 7500.0000 | | SUNDAR P | 40000.00 | 7000.0000 | | ANISHA RAWAT | 20000.00 | 6000.0000 | | SANA KHAN | 30000.00 | 6500.0000 | +---------------+----------+------------+

D. Write DML statements for the following purpose:

1. Assign DEPT_ID 'D03' to those employees who are presently working at 'D02'.

SOLUTION	OUTPUT
UPDATE EMPL SET DEPT_ID = 'D03' WHERE DEPT_ID = 'D02'; SELECT * FROM EMPL;	+------+-------------+-----+------------+----------+---------+--------+---------+ | EID | ENAME | GEN | DOJ | HOMETOWN | SALARY | MGR_ID | DEPT_ID | +------+-------------+-----+------------+----------+---------+--------+---------+ | E0001 | RITU SEN | F | 2002-06-20 | KOLKATA | 40000.00 | NULL | D03 | | E0002 | MALCOM RAY | M | 1998-11-12 | BANGALORE | 50000.00 | NULL | D03 | | E0003 | SUNDAR P | M | 2008-12-09 | BANGALORE | 40000.00 | NULL | D01 | | E0004 | ANISHA RAWAT | F | 2019-09-04 | DELHI | 20000.00 | E0001 | D03 | | E0005 | SANA KHAN | F | 2017-08-31 | DELHI | 30000.00 | E0003 | D01 | +------+-------------+-----+------------+----------+---------+--------+---------+

2. Increase SALARY of all the employees by 10%.

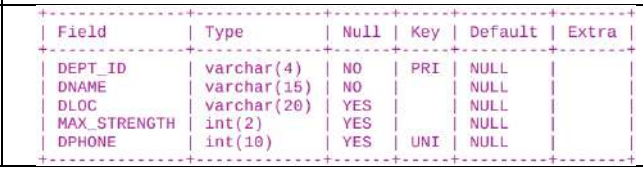
SOLUTION	OUTPUT
UPDATE EMPL SET SALARY = 1.1 * SALARY; SELECT * FROM EMPL;	+------+-------------+-----+------------+----------+---------+--------+---------+ | EID | ENAME | GEN | DOJ | HOMETOWN | SALARY | MGR_ID | DEPT_ID | +------+-------------+-----+------------+----------+---------+--------+---------+ | E0001 | RITU SEN | F | 2002-06-20 | KOLKATA | 44000.00 | NULL | D03 | | E0002 | MALCOM RAY | M | 1998-11-12 | BANGALORE | 55000.00 | NULL | D03 | | E0003 | SUNDAR P | M | 2008-12-09 | BANGALORE | 44000.00 | NULL | D01 | | E0004 | ANISHA RAWAT | F | 2019-09-04 | DELHI | 22000.00 | E0001 | D03 | | E0005 | SANA KHAN | F | 2017-08-31 | DELHI | 33000.00 | E0003 | D01 | +------+-------------+-----+------------+----------+---------+--------+---------+

3. Delete the department 'D02' from DEPT table.

SOLUTION	OUTPUT
DELETE FROM DEPT WHERE DEPT_ID = 'D02'; SELECT * FROM DEPT;	+---------+---------+---------+--------------+ | DEPT_ID | DNAME | DLOC | MAX_STRENGTH | +---------+---------+---------+--------------+ | D01 | FINANCE | MUMBAI | 20 | | D03 | IT | CHENNAI | 5 | +---------+---------+---------+--------------+

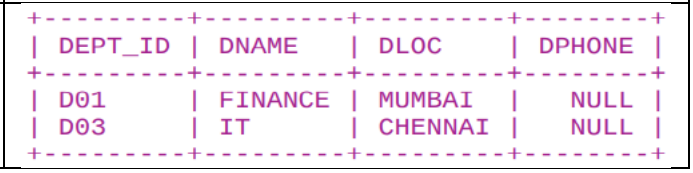
E. Write DDL statements for the following purpose:

1. Add DPHONE field to table DEPT which should be a number of 10 digits and unique for each department.

SOLUTION	OUTPUT
ALTER TABLE DEPT **ADD DPHONE INT(10) UNIQUE;** **DESC DEPT;**	

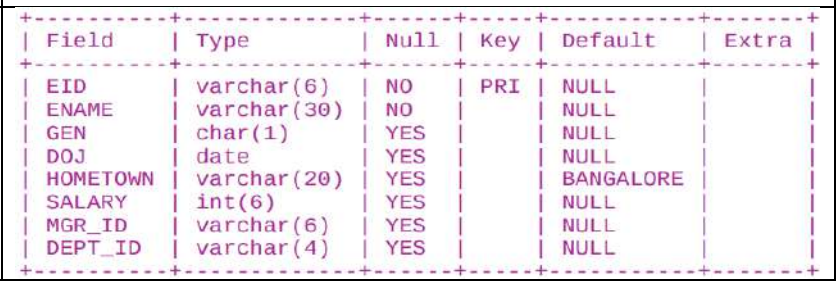
Field	Type	Null	Key	Default	Extra
DEPT_ID	varchar(4)	NO	PRI	NULL	
DNAME	varchar(15)	NO		NULL	
DLOC	varchar(20)	YES		NULL	
MAX_STRENGTH	int(2)	YES		NULL	
DPHONE	int(10)	YES	UNI	NULL	

2. Drop the column MAX_STRENGTH from DEPT.

SOLUTION	OUTPUT
ALTER TABLE DEPT **DROP MAX_STRENGTH;** **SELECT * FROM DEPT;**	

DEPT_ID	DNAME	DLOC	DPHONE
D01	FINANCE	MUMBAI	NULL
D03	IT	CHENNAI	NULL

3. Modify the datatype of SALARY in table EMPL to an integer of length 6 and drop the existing check constraint.

SOLUTION	OUTPUT
ALTER TABLE EMPL **MODIFY SALARY INT(6);** **DESC EMPL;**	

Field	Type	Null	Key	Default	Extra
EID	varchar(6)	NO	PRI	NULL	
ENAME	varchar(30)	NO		NULL	
GEN	char(1)	YES		NULL	
DOJ	date	YES		NULL	
HOMETOWN	varchar(20)	YES		BANGALORE	
SALARY	int(6)	YES		NULL	
MGR_ID	varchar(6)	YES		NULL	
DEPT_ID	varchar(4)	YES		NULL	

Questions ;

Q. No. 1 to 20 are MCQs of 1 mark each	
1.	An attribute in a table is foreign key if it is the _____key in any other table. a) Candidate b) Primary c) Unique d) Alternate
2.	What is the domain of an attribute? (a) The set of possible values that the attribute can take (b) The name of the attribute (c) The data type of the attribute (d) None of the above
3.	Which of the following is not a database constraint? a. CHECK b. DEFAULT c. UNIQUE d. NULL
4.	The data types CHAR (n) and VARCHAR (n) are used to create _____ and _____ types of string/text fields respectively in a database. a) Fixed, equal b) Equal, variable c) Fixed, variable d) Variable, equal
5.	Which of the following is a DDL command? A. UPDATE B. INSERT C. DELETE D. ALTER
6.	Which command is used to open the database "SCHOOL"? a. USE SCHOOL b. OPEN SCHOOL

	c. USE DATABASE SCHOOL d. SHOW SCHOOL
7.	In the given query which keyword has to be inserted? INSERT INTO employee_____(1002, "Kausar", 2000); a) Value b) Values c) Values into d) Into Values
8.	Which SQL statement is used to display all the data from PRODUCT table in the decreasing order of PRICE? a. SELECT * FROM PRODUCT ORDER PRICE BY DESC ; b. SELECT * FROM PRODUCT PRICE ORDER BY DESC; c. SELECT * FROM PRODUCT ORDER BY DESC PRICE; d. SELECT * FROM PRODUCT ORDER BY PRICE DESC;
9.	Which of the following function is used to FIND the largest value from the given data in MYSQL? a) MAX () b) MAXIMUM () c) LARGEST () d) BIG ()
10.	Which keyword is used for aliasing a table? a) ASC b) AS c) IS d) None of these
11.	_____ aggregate function does not ignore NULL values in a column. a) Min() b) Sum() c) Avg () d) Count ()
12.	SELECT name FROM class WHERE subject_____NULL; Which comparison operator may be used to fill the blank space in above query? a) = b) LIKE c) IS d) <>
13.	Which SQL statement is used to display all the data from ITEMS table where INAME is ending with 'L'? a. SELECT * FROM ITEMS WHERE INAME LIKE 'L%'; b. SELECT * FROM ITEMS WHERE INAME LIKE '%L'; c. SELECT * FROM ITEMS WHERE INAME LIKE '%L%'; d. SELECT * FROM ITEMS WHERE INAME LIKE '_L_';
14.	Which join combines each row from the first table with every row from the second table to make the result set? a. CROSS JOIN b. OUTER JOIN c. INNER JOIN d. EQUI JOIN
	State True / False for Q. No. 15 and 16
15.	MySQL statement to delete a table STUDENT from the database SCHOOL is DELETE TABLE STUDENT;
16.	Where and Having clauses can be used interchangeably in SQL queries.
	Q. No. 17 to 20 are ASSERTION (A) and REASONING (R) 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 correct explanation for A.** **c. A is true but R is false.** **d. A is false but R is true.**
17.	Assertion (A): A foreign key in the relational data model is a set of attributes in one relation that references the primary key of another relation. Reason (R): Foreign keys are used to establish relationships between tables.
18.	Assertion(A): DBMS is an application package which arranges the data in orderly manner in a tabular form. Reason(R): It is an interface between database and the user. It allows the users to access and perform various operations on stored data using some tools.
19.	Assertion(A): Aggregate function AVG() calculates the average of a set of values and produces a single value as result. Reason(R): The aggregate functions are used to perform some basic calculations

like sum, max, min, etc on a set of numbers.

20. Assertion(A): While inserting records in EMP table, value of DateOfBirth field must be enclosed withing quotes ‘ ‘.
Reasoning(R): Date is represented as char / varchar always.

Q. No. 21 to 30 are questions of 2 marks each

21. a) What do you mean by degree and cardinality of a table?
b) Consider the following table and find its degree and cardinality.

Customer_Details

Customer_id	Name	Address	Age
1	Billie	NY	22
2	Eilish	London	19
3	Ariana	Miami	18
4	Selena	New Jersey	32
5	Kety	Hawaii	42
6	Adele	Miami	29

22. What do you mean by referential integrity? Explain with suitable example.

23. Write MySQL statement to create a table named REMEDIAL based on the following specification:

Table: REMEDIAL

Attribute	Data type	Constraints
SNAME	VARCHAR(20)	NOT NULL
ROLL	INT	UNIQUE
FEES	FLOAT	
ADMN	INT	PRIMARY KEY

24. Write MySQL statements to do the following:
    a. Enter into the database OFFICE and display the name of all the tables.
    b. Display the structure of the table ‘EMPL’.

25. Consider the following table PLAYER:

PNO	PNAME	SPORTS	COUNTRY	SALARY
C001	VIRAT	CRICKET	INDIA	112
F003	RONALDO	FOOTBALL	PORTUGAL	1134
T007	ROGER	TENNIS	SWITZERLAND	795
B002	SINDHU	BADMINTON	INDIA	59

    a. Suggest the most suitable Primary Key. Justify your answer.
    b. Identify the alternate Keys.

26. Consider the table MOTOR having the following attributes:
VNO, MODEL, BRAND, PRICE

Write SQL statement for the following:
    a. Modify the existing column MODEL as varchar(30) and NOT NULL.
    b. Increase PRICE by 20% for the BRAND ‘TATA’

27.	Categorize the following commands as DDL or DML: INSERT, UPDATE, ALTER, DROP
28.	A MySQL table, sales have 10 rows. The following queries were executed on the sales table. SELECT COUNT(*) FROM sales; COUNT(*) 10 SELECT COUNT(discount) FROM sales; COUNT(discount) 6 Write a statement to explain as to why there is a difference in both the counts.
29.	Explain Group by clause with a suitable example.
30.	Distinguish between Natural Join and Equi Join.
	Q. No. 31 to 40 – 3 marks question
31.	Write output of the SQL queries based on the following table Employee: Table: Employee +-----+----------+------------+------------+--------+---------+ | EID | Name | DOB | DOJ | Salary | Project | +-----+----------+------------+------------+--------+---------+ | E01 | Ranjan | 1990-07-12 | 2015-01-21 | 150000 | P01 | | E02 | Akhtar | 1992-06-21 | 2015-02-01 | 125000 | P04 | | E03 | Muneera | 1996-11-15 | 2018-08-19 | 135000 | P01 | | E04 | Alex | 1991-10-25 | 2018-10-19 | 75000 | P02 | | E05 | Satyansh | 1993-12-16 | 2018-10-19 | 85000 | P04 | +-----+----------+------------+------------+--------+---------+ (i) select name, project from employee order by project; (ii) select name, salary from employee where doj like '2015%'; (iii) select min(doj), max(dob) from employee;
32.	Write output of the SQL queries based on the following tables Projects and Employee: Table: Projects +-----+----------------------+------------+------------+ | PID | PName | Startdate | Enddate | +-----+----------------------+------------+------------+ | P01 | Road 102 Carpeting | 2022-01-28 | 2022-02-26 | | P02 | Civil Lines Parking | 2022-01-30 | 2023-01-29 | | P03 | T-3 Renovation | 2022-03-16 | 2022-12-15 | | P04 | Footover Bridge K-13 | 2022-03-19 | 2023-02-01 | +-----+----------------------+------------+------------+ Table: Employee +-----+----------+------------+------------+--------+---------+ | EID | Name | DOB | DOJ | Salary | Project | +-----+----------+------------+------------+--------+---------+ | E01 | Ranjan | 1990-07-12 | 2015-01-21 | 150000 | P01 | | E02 | Akhtar | 1992-06-21 | 2015-02-01 | 125000 | P04 | | E03 | Muneera | 1996-11-15 | 2018-08-19 | 135000 | P01 | | E04 | Alex | 1991-10-25 | 2018-10-19 | 75000 | P02 | | E05 | Satyansh | 1993-12-16 | 2018-10-19 | 85000 | P04 | +-----+----------+------------+------------+--------+---------+ (i) select project, count(*) from employee group by project; (ii) select pid, pname, eid, name from projects p, employee e where p.pid=e.project; (iii) select avg(salary) from employee where doj between '2018-08-01' and '2018-08-31';

33. Write SQL statements to do the following:

COMPANY

CID	NAME	CITY	PRODUCTNAME
111	SONY	DELHI	TV
222	NOKIA	MUMBAI	MOBILE
333	ONIDA	DELHI	TV
444	SONY	MUMBAI	MOBILE
555	BLACKBERRY	MADRAS	MOBILE
666	DELL	DELHI	LAPTOP

CUSTOMER

CUSTID	NAME	PRICE	QTY	CID
101	ROHAN SHARMA	70,000	20	222
102	DEEPAK KUMAR	50,000	10	666
103	MOHAN KUMAR	30,000	5	111
104	SAHIL BANSAL	35,000	3	333
105	NEHA SONI	25,000	7	444
106	SONAL AGGARWAL	20,000	5	333
107	ARUN SINGH	50,000	15	666

i. Define CID in CUSTOMER table as Foreign Key that refers to CID i.e. Primary Key of COMPANY table.

ii. Display the 'CUSTOMER NAME', 'PRODUCT NAME' who have purchased any product from the 'COMPANY NAME' 'SONY'.

iii. Increase the QTY by 15 for the products with PRICE below 40,000.

34. Consider the GAMES table and answer the following questions:

Table: GAMES

GCode	GameName	Number	PrizeMoney	ScheduleDate
101	CaromBoard	2	5000	23-Jan-2004
102	Badminton	2	12000	12-Dec-2003
103	TableTennis	4	8000	14-Feb-2004
105	Chess	2	9000	01-Jan-2004
108	LawnTennis	4	25000	19-Mar-2004

i. Identify the possible Candidate Keys in the above table.
ii. Suggest the most suitable column for Primary key of the above table. Give reason behind your answer.
iii. Write down the Alternate Keys for the above table.

35. Consider a table STORE having attributes as following:

ItemNo –numeric
ItemName – character of size 20
Scode – numeric
Quantity – numeric

Abhay wants to do the following operations on the STORE table. Please help him to do by writing appropriate SQL statements.

i. Insert the following record in the STORE table:
(2010, Notebook, 23, NULL)
ii. Add a new column price with data type as decimal.

iii. Remove STORE table from the database.

36. What do you mean b y CHECK constraint and DEFAULT constraint? Explain with suitable example.

37. Consider the following tables and answer the questions below:

Table : PRODUCT

P_ID	ProductName	Manufacturer	Price
TP01	Talcom Powder	LAK	40
FW05	Face Wash	ABC	45
BS01	Bath Soap	ABC	55
SH06	Shampoo	XYZ	120
FW12	Face Wash	XYZ	95

Table : CLIENT

C_ID	ClientName	City	P_ID
01	Cosmetic Shop	Delhi	FW05
06	Total Health	Mumbai	BS01
12	Live Life	Delhi	SH06
15	Pretty Woman	Delhi	FW12
16	Dreams	Banglore	TP01

i. What will be the degree and cardinality of the resultant table after performing Cartesian Product between PRODUCT and CLIENT?
ii. What will be the degree and cardinality of the resultant table after performing NATURAL JOIN between PRODUCT and CLIENT?
iii. Are these values same? What can be the reason for this?

38. i. Write down the purpose of using aggregate functions in MySql.
ii. Give example of any two aggregate functions and their purposes.
iii. Can we use aggregate functions without GROUP BY clause? Justify.

39. i. What is the significance of NULL value in database?
ii. Name the operator that can check for NULL value in a column.
iii. Name the SQL command to permanently save the changes caused by DML statements in the database.

40. i. Name the aggregate functions valid on a column of DATE data type.
ii. Suggest a keyword for renaming an attribute or a table in MySql.
iii. Write down the syntax of representing the common column CODE while performing Equi Join between two tables GAME and USER.

Q. No. 41 to 45 – 5 marks question

41. i. Differentiate between 'WHERE' clause and 'HAVING' clause in MySQL with appropriate example.

ii. Consider the following table and find the output of the following queries:

TEACHER

TCODE	TNAME	SUBJECT	SEX	SALARY
5467	Narendra Kumar	Computer Science	M	70000
6754	Jay Prakash	Accountancy	M	Null
8976	Ajay Kumar	Chemistry	M	65000
5674	Jhuma Nath	English	F	55000
8756	Divya Bothra	Computer Science	F	75000
6574	Priyam Kundu	Physics	M	Null
3425	Dinesh Verma	Economics	M	71000

a. select SEX, avg(SALARY) from TEACHER group by SEX;

b. select SUBJECT, count(*) from TEACHER group by SUBJECT having count(*)>1;

c. select SUBJECT, min(SALARY) from TEACHER

	where TNAME not like '%Kumar' group by SUBJECT;
42.	i. Differentiate between DELETE and DROP in MySQL. Cite suitable examples. ii. Consider the following tables – Bank_Account and Branch: BANK_ACCOUNT E_CODE | NAME E01 | ASHISH E02 | SURESH BRANCH E_CODE | LOCATION E05 | MUMBAI What will be the output of the following statement? SELECT * FROM Bank_Account, Branch; iii. Choose the correct option: The above SQL query represents _____ operation. a. Outer join b. Natural join c. Equi join d. Cross join
43.	Fill in the blanks with appropriate keywords in order to complete the following SQL queries: CAR **CID** | **BRAND** | **MODEL** | **TYPE** | **COLOUR** | **PRICE** CO1 | MARUTI | SWIFT | HATCHBACK | WHITE | 5,00,000 D32 | HYUNDAI | VERNA | SEDAN | BLACK | 16,00,000 F32 | TATA | NEXON | SUV | RED | 9,00,000 C29 | KIA | SELTOS | SUV | BLUE | 17,00,000 i. Display all the databases present in MySQL of a system. show _____ ; ii. Display the values in TYPE column of the table CAR after removing the duplicate values from the output. select _____ TYPE from CAR; iii. Display MODEL, PRICE, COLOUR from CAR whose COLOUR is neither RED nor BLUE. select MODEL, PRICE, COLOUR from CAR where COLOUR _____ ('RED', 'BLUE'); iv. Display the total number of records present in CAR table. select _____(CID) from CAR; v. Display Discount on each CAR where Discount is 5% of the PRICE. select MODEL, PRICE*0.05 _____ 'DISCOUNT' from CAR;
44.	i. Write two advantages of using database. ii. Distinguish between CHAR and VARCHAR data type. Which one is preferable in general and why? iii. Write down the significance of the data type NUMERIC(7,3).
45.	i. What do you mean by Self Join. Give an example. ii. Fill in the blanks with appropriate keywords for creating the table DRESS with the following specifications: • Default COLOR is 'BLACK'. • PRICE between 0 and 8000.

CREATE _____(a)_____ DRESS
(
DCODE INT PRIMARY KEY,
DNAME VARCHAR(15),
COLOR VARCHAR(10) ____(b)____ 'BLACK',
PRICE DECIMAL(6, 2) _____(c)____ PRICE BETWEEN 0 and 8000
);

Q. No. 46 to 50 – Case Study based questions of 4 marks each

46. Consider the following tables ITEM and CUSTOMER and find the outputs of the following queries:

Table: ITEM

ID	Item_Name	Manufacturer	Price
PC01	Personal Computer	ABC	35000
LC05	Laptop	ABC	55000
PC03	Personal Computer	XYZ	32000
PC06	Personal Computer	COMP	37000
LC03	Laptop	PQR	57000

Table: CUSTOMER

C_ID	CName	City	ID
01	N Roy	Delhi	LC03
06	R Singh	Mumbai	PC03
12	R Pandey	Delhi	PC06
15	C Sharma	Delhi	LC03
16	K Agarwal	Bangalore	PC01

i) SELECT ITEM_NAME, MAX(PRICE), COUNT(*) FROM ITEM GROUP BY ITEM_NAME;

ii) SELECT CNAME, MANUFACTURER FROM ITEM, CUSTOMER WHERE ITEM.ID=CUSTOMER.ID;

iii) SELECT ITEM_NAME, PRICE*100 FROM ITEM WHERE MANUFACTURER="ABC";

iv) SELECT DISTINCT CITY FROM CUSTOMER;

47. Consider the tables ITEM and CUSTOMER and write the queries:

TABLE: SCHOOL

CODE	TEACHERNAME	SUBJECT	DOJ	PERIODS	EXPERIENCE
1001	RAVI SHANKAR	ENGLISH	12/03/2000	24	10
1009	PRIYA RAI	PHYSICS	03/09/1998	26	12
1203	LISA ANAND	ENGLISH	09/04/2000	27	5
1045	YASHRAJ	MATHS	24/08/2000	24	15
1123	GANAN	PHYSICS	16/07/1999	28	3
1167	HARISH B	CHEMISTRY	19/10/1999	27	5
1215	UMESH	PHYSICS	11/05/1998	22	16

TABLE: ADMIN

CODE	GENDER	DESIGNATION
1001	MALE	VICE PRINCIPAL
1009	FEMALE	COORDINATOR
1203	FEMALE	COORDINATOR
1045	MALE	HOD
1123	MALE	SENIOR TEACHER
1167	MALE	SENIOR TEACHER
1215	MALE	HOD

(i) Display the total PERIODS for each SUBJECT from SCHOOL table.

(ii) Display TEACHERNAME, GENDER from the tables SCHOOL and ADMIN whose DESIGNATION is 'COORDINATOR'.

(iii) Display TEACHERNAME and DOJ in the descending order of CODE.

(iv) Display TEACHERNAME whose DOJ is in the year 2000.

48. Modern Public School is maintaining fees records of students. The database administrator Aman decided that-

- Name of the database -School
- Name of the table – Fees
- The attributes of Fees are as follows:
  - Rollno – numeric
  - Name – character of size 20
  - Class - character of size 20
  - Fee – Numeric
  - PayDate – Date
  - Primary Key – (Rollno, Class)

Answer the following questions:

(i) Write the DDL statement to create database School.
(ii) Write the SQL statement to create Fees table in School database with the above-mentioned specifications.
(iii) Write SQL statement to display all the table names in School database.

49. Consider the table Fees mentioned in Q. No. 48 and answer the following questions:

i. Insert the following record into the table
Rollno-1201, Name-Akshay, Class-12th, Fee-350, PayDate-24 JUNE 2019

ii. Increase the second quarter fee of class 12th students by 50.
iii. Delete the record of student with Rollno-1212
iv. Aman wants to display the schema (structure) of Fees table. Which command will he use from the following:

a) CREATE b) ALTER c) SHOW d) DESCRIBE

50. Sagar, a cloth merchant creates a table CLIENT with a set of records to maintain the client's order volume in Qtr1, Qtr2, Qtr3 and their total. After creation of the table, he has entered data of 7 clients in the table.

CLIENT

ClientName	Client_ID	Qtr1	Qtr2	Qtr3	Total
Suraj	C120	200	300	400	900
Radha	C650	190	356	220	766
Estha	C430	200	100	400	700
Karuna	C790	130	540	380	1050
Naresh	C660	200	400	800	1400
Varun	C233	400	300	220	920
Kritika	C540	500	100	400	1000

Based on table CLIENT, write SQL statements for the following:

i. Write the statements to Update a record present in the table with data for Qtr2 = 200, Qtr3 = 600 , total = sum of all Qtrs where the Client_ID is C660.
ii. Delete all records where total is between 500 to 900.

	iii. Make changes in ClientName with data type varchar(20) and not null constraint. iv. Remove the column Total from the CLIENT table.

SOLUTIONS

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

21. a) Degree - no. of attributes in a table, Cardinality – no. of records in a table.
b) Degree – 4, cardinality – 6

22. Foreign key of one table refers to the Primary key of another table.

23.
```
CREATE TABLE REMEDIAL
(
        SNAME VARCHAR(20) NOT NULL,
        ROLL INT(5) UNIQUE,
        FEES FLOAT(7,2),
        ADMN INT(5) PRIMARY KEY
);
```

24. a. USE OFFICE;
b. DESC EMPL; or DESCRIBE EMPL;

25. a. PNO as unique throughout table and not null.
b. PNAME, SPORTS, SALARY.

26. a. ALTER TABLE MOTOR MODIFY MODEL VARCHAR(30) NOT NULL;
b. UPDATE MOTOR SET PRICE = PRICE * 1.20 WHERE BRAND = 'TATA';

27. DML - INSERT, UPDATE
DDL - ALTER, DROP

28. Count(*) will return the number of records in the table sales. Count(discount) will return the number of records having not null values in the discount field of sales table.

29. GROUP BY clause is used if statistical records of a table are to be displayed based on a field. Groups are formed based on the number of different values in the GROUP BY column present in the table.

30. In Natural Join the common attribute between two tables appears only once. Where as in Equi Join the common attribute appears as it is i.e. twice. Hence these common attributes are accessed as table_name.attribute in the query to resolve the conflict.

31. i.

Name	**Project**
Ranjan	P01
Muneera	P01
Alex	P02
Akhtar	P04
Satyansh	P04

ii.

Name	**Salary**
Ranjan	150000
Akhtar	125000

iii.

min(DOJ)	**max(DOB)**
2015-01-21	1996-11-15

<table>
<tr><td></td><td></td></tr>
<tr><td>32.</td><td>i.
<table><tr><th>Project</th><th>count(*)</th></tr><tr><td>P01</td><td>2</td></tr><tr><td>P04</td><td>2</td></tr><tr><td>P02</td><td>1</td></tr></table></td></tr>
<tr><td></td><td>ii.
<table><tr><th>PID</th><th>PName</th><th>EID</th></tr><tr><td>P01</td><td>Road 102 Carpenting</td><td>E01</td></tr><tr><td>P04</td><td>Footover Bridge K-13</td><td>E02</td></tr><tr><td>P01</td><td>Road 102 Carpenting</td><td>E03</td></tr><tr><td>P02</td><td>Civil Lines Parking</td><td>E04</td></tr><tr><td>P04</td><td>Footover Bridge K-13</td><td>E05</td></tr></table>
iii.
<table><tr><td>avg(Salary)</td></tr><tr><td>135000</td></tr></table></td></tr>
<tr><td>33.</td><td>i. ALTER TABLE CUSTOMER
ADD FOREIGN KEY(CID) REFERENCES COMPANY(CID);

ii. SELECT CU.NAME, CO.PRODUCTNAME
FROM COMPANY CO, CUSTOMER CU
WHERE CU.CID = CO.CID AND CO.NAME = ‘SONY’;

iii. UPDATE CUSTOMER SET QTY = QTY*1.15 where PRICE<40000;</td></tr>
<tr><td>34.</td><td>i. Candidate keys - GCode, GameName, PrizeMoney, ScheduleDate
ii. Primary key - GCode as not null and unique for each game.
iii. Alternate key - GameName, PrizeMoney, ScheduleDate</td></tr>
<tr><td>35.</td><td>i. INSERT INTO STORE VALUES (2010, ‘Notebook’, 23, NULL);
ii. ALTER TABLE STORE ADD PRICE DECIMAL(10,2);
iii. DROP TABLE STORE;</td></tr>
<tr><td>36.</td><td>CHECK – Ensure that the attribute contains only permissible set of values.
DEFAULT – Ensure the default value is inserted if no value is mentioned.
e.g. -
CREATE TABLE STOCK
(
SNO INT PRIMARY KEY,
SNAME VARCHAR(20),
LOCATION VARCHAR(15) DEFAULT ‘BANGALORE’,
PRICE FLOAT(7,2) CHECK (PRICE BETWEEN 0.00 AND 10000.00)
)</td></tr>
<tr><td>37.</td><td>i. After Cartesian product, Degree = 8, Cardinality = 25
ii. After natural join, Degree = 7, Cardinality = 5
iii. No, because cartesian product is the all-possible combination of tuples between two tables. Where as Natural join selects only those tuples for whom the values of the common attributes are same.</td></tr>
<tr><td>38.</td><td>i. Aggregate functions perform calculation on a set of values, and returns a single</td></tr>
</table>

<table>
<tr><td></td><td>value. If used with GROUP BY clause, it returns one value for each group.
SUM() - returns the total sum of a numerical column
MAX() - returns the largest value within the selected column

ii. Yes. Then it returns a single value for the selected attribute by considering all the records in that table.</td></tr>
<tr><td>39.</td><td>i. NULL is said to be absence of any value in an attribute. NULL cannot participate in any operation.
ii. IS
iii. COMMIT</td></tr>
<tr><td>40.</td><td>i. MAX(), MIN(), COUNT()
ii. AS
iii. SELECT * FROM GAME G, USER U WHERE G.CODE=U,CODE;</td></tr>
<tr><td>41.</td><td>i. WHERE clause allows to filter data from individual rows of a table based on certain conditions. In contrast, the HAVING clause allows to filter data from a group of rows in a query based on conditions involving aggregate functions.
ii.
a)
<table><tr><th>SEX</th><th>AVG(SALARY)</th></tr><tr><td>M</td><td>68666</td></tr><tr><td>F</td><td>65000</td></tr></table>
b)
<table><tr><th>SUBJECT</th><th>COUNT(*)</th></tr><tr><td>Computer Science</td><td>2</td></tr></table>
c)
<table><tr><th>SUBJECT</th><th>MIN(SALARY)</th></tr><tr><td>Computer Science</td><td>75000</td></tr><tr><td>English</td><td>55000</td></tr><tr><td>Economics</td><td>71000</td></tr></table></td></tr>
<tr><td>42.</td><td>i. DELETE is used for deleting records from a table. DROP is used to delete the entire schema of any database object like table.
e.g. –
DELETE FROM STUDENT WHERE ROLL = 5;
DROP TABLE STUDENT;
ii.
<table><tr><td>E_CODE</td><td>NAME</td><td>E_CODE</td><td>LOCATION</td></tr><tr><td>E01</td><td>ASHISH</td><td>E05</td><td>MUMBAI</td></tr><tr><td>E02</td><td>SURESH</td><td>E05</td><td>MUMBAI</td></tr></table>iii. d. Cross join</td></tr>
<tr><td>43.</td><td>i. databases
ii. distinct
iii. not in
iv. count
v. as</td></tr>
<tr><td>44.</td><td>i. Data integrity, data security
ii. Char data type stores data of fixed length, whereas the Varchar data type stores variable length data. Varchar is preferable as it is more flexible for data of any size.
iii. It can represent 7 digit real number with 3 digits in the right of decimal point.</td></tr>
<tr><td>45.</td><td>i. A self-join is a regular join, but the table is joined with itself.</td></tr>
</table>

SELECT * FROM EMP A, EMP B where A.ID = B.ID;

ii.

(a) TABLE
(b) DEFAULT
(c) CHECK

46. i.

ITEM_NAME	MAX(PRICE)	COUNT(*)
Personal Computer	37000	3
Laptop	57000	2

ii.

CNAME	MANUFACTURER
N Roy	PQR
R Singh	XYZ
R Pandey	COMP
C Sharma	PQR
K Agarwal	ABC

iii.

ITEM_NAME	PRICE*100
Personal Computer	3500000
Laptop	5500000

iv.

City
Delhi
Mumbai
Bangalore

47. (i) SELECT SUM (PERIODS), SUBJECT FROM SCHOOL
GROUP BY SUBJECT;

(ii) SELECT TEACHERNAME, GENDER FROM SCHOOL, ADMIN WHERE DESIGNATION = 'COORDINATOR' AND SCHOOL.CODE=ADMIN.CODE;

(iii) SELECT TEACHERNAME, DOJ FROM SCHOOL ORDER BY CODE DESC;

(iv) SELECT TEACHERNAME FROM SCHOOL WHERE DOJ LIKE '%2000';

48. i. CREATE DATABASE SCHOOL;
ii. USE SCHOOL

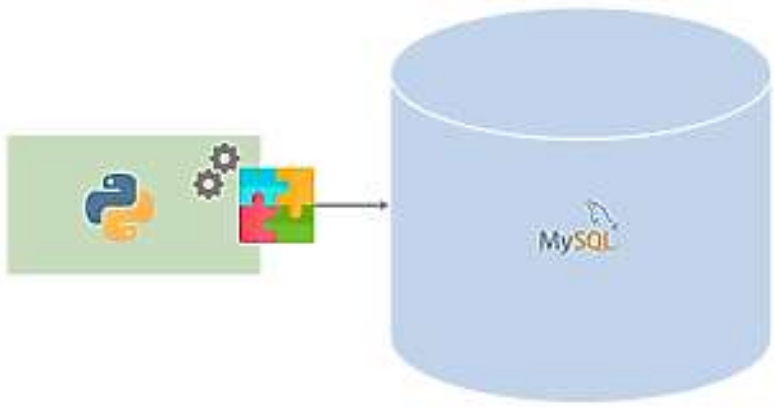
```
create table Fees
(
        Rollno numeric(5),
        Name varchar(20),
        Class varchar(20),
        Fee Numeric(7,2),
        PayDate Date,
        Primary Key(Rollno, Class)
);
```

iii. SHOW TABLES

49. i. INSERT INTO FEES VALUES(1201, 'Akshay', '12th', 350, '2019-06-24');
ii. UPDATE TABLE FEES SET FEE = FEE+50 WHERE CLASS='12th';

	iii. DELETE FROM FEES WHERE ROLLNO =1212; iv. d) DESCRIBE
50.	i. UPDATE CLIENT SET Qtr2 = 200, Qtr3 = 600, Total = Qtr1+Qtr2+Qtr3 WHERE Client_ID = 'C660'; ii. DELETE FROM CLIENT WHERE Total between 500 AND 900; iii. ALTER TABLE CLIENT MODIFY ClientName VARCHAR(20) NOT NULL; iv. ALTER TABLE CLIENT MODIFY DROP Total;

Interface of Python with an SQL database



Connecting SQL with Python

A Python library - mysql connector is required which provides connectivity from Python to Mysql. There are mainly six steps that must be followed in Python environment to create a database connectivity application. Steps for Creating Database Connectivity Applications:-

1. Import the package required for database access.
2. Open a connection to database.
3. Create a cursor instance.
4. Execute a query.
5. Extract data from result set or make the changes permanent.
6. Clean up the environment.

To establish the connection, write codes in script mode:

1. Import the Library

```
import mysql.connector
```

2. connect() statement to create a connection to the Mysql server and returns a Mysql connection object mydb and pass three parameters, if required then also pass database parameter.

```
mydb=mysql.connector.connect(host='localhost',user='root',passwd='password')
```

3. Creating cursor object of a class cursor which allows python code to execute sql commands.

```
mycursor=mydb.cursor()
```

4. execute() statement with sql query to execute SQL query from python.

```
mycursor.execute("sql query")
```

5. To read the data from the table of database using fetchone()/ fetchmany()/ fetchall() methods as per requirement and store in a resulset.

```
myresult = mycursor.fetchall()
```

To save the current transactions of inserting, updating and deleting data we use:

```
mydb.commit()
```

6. close() to close the connection and clean up the environment

```
mydb.close()
```

Code For Creating A Mysql Database Through Python

```
import mysql.connector
mydb = mysql.connector.connect(host="localhost", user="john", password="john")
mycursor = mydb.cursor()
mycursor.execute("CREATE DATABASE mydatabase")
```

Code For Creating A Table In Mysql Through Python

```
import mysql.connector
mydb = mysql.connector.connect(host="localhost",user="john",password="john",
database="mydatabase")
mycursor = mydb.cursor()
mycursor.execute("CREATE TABLE customers (name VARCHAR(255), address
VARCHAR(255))")
```

Code For Inserting Data In A Mysql Table Through Python

```
import mysql.connector
mydb = mysql.connector.connect(host="localhost", user="john",password="john",
database="mydatabase")
mycursor = mydb.cursor()
sql = "INSERT INTO customers (name, address) VALUES (%s, %s)"
val = ("Mary", "ABC")
mycursor.execute(sql, val)
mydb.commit()
```

Code For Displaying Data From A Mysql Table Through Python

```
import mysql.connector
mydb = mysql.connector.connect(host="localhost",user="john", password="john",
database="mydatabase”)
mycursor = mydb.cursor()
mycursor.execute("SELECT * FROM customers")
```

```
myresult = mycursor.fetchall()
for x in myresult:
        print(x)
```

Code For Deleting A Record From Mysql Table Using Python

```
import mysql.connector
mydb =
mydb = mysql.connector.connect(host="localhost", user="john",password="john",
database="mydatabase")
mycursor = mydb.cursor()
sql = "DELETE FROM customers WHERE name = 'XYZ'"
mycursor.execute(sql)
mydb.commit()
```

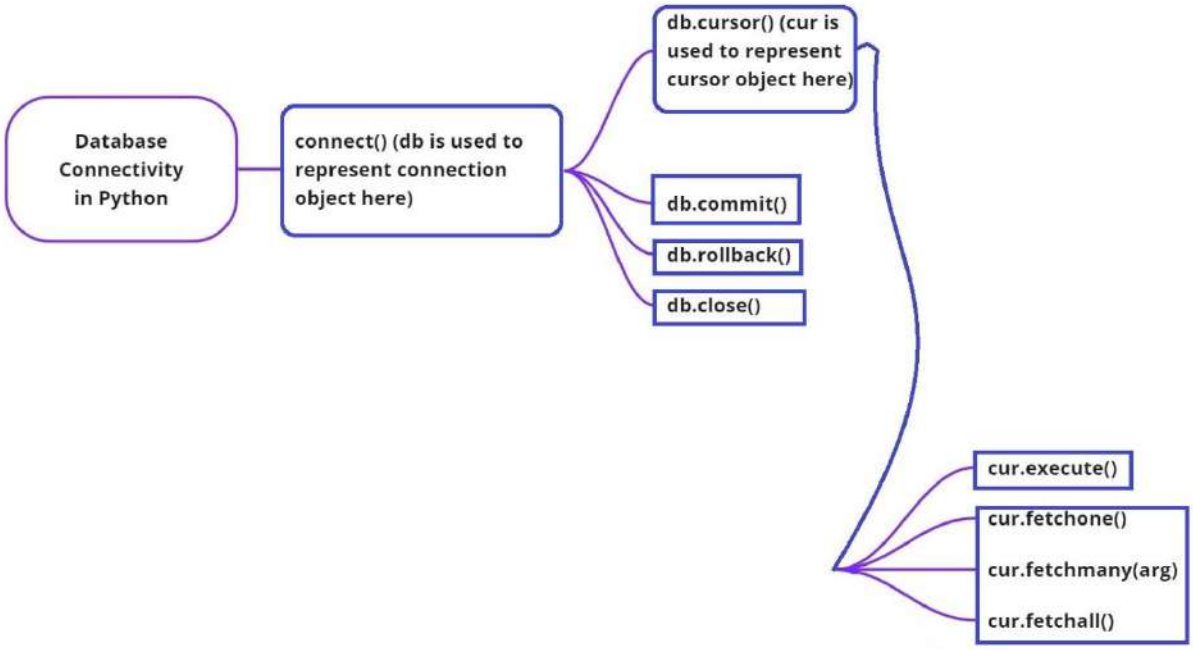
Code For Updating A Record From Mysql Table Using Python

```
import mysql.connector
mydb = mysql.connector.connect(host="localhost", user="john",password="john",
database="mydatabase")
mycursor = mydb.cursor()
sql = "UPDATE customers SET address = 'Canyon 123' WHERE address = 'Valley 123'"
mycursor.execute(sql)
mydb.commit()
```

mycursor.rowcount: To count total number of records affected by the execute method.

```
print(mycursor.rowcount)
```

Mind Map – Python MySql Connectivity



1 Mark Questions (MCQ)

1. To establish a connection with MySQL from Python which of the following functions is used?
(a) connection()
(b) connect()
(c) open()
(d) cursor()

2. execute() method can execute _____ .
(a) DDL statements
(b) DML statements
(c) DDL and DML statements.
(d) Select statement only

3. To establish a connection between Python and sql database, connect() is used. Which of the following arguments may not necessarily be given while calling connect()?
(a) host
(b) database
(c) user
(d) password

4. What is the purpose of the `rowcount` attribute in Python-Mysql database connectivity?
(a) Number of rows affected by the last executed command
(b) Total number of rows in the database
(c) Total number of columns in the database
(d) Number of tables in the database

5. Which method is used to retrieve N number of records
(a) fetchone()
(b) fetchall()
(c) fetchmany()
(d) fetchN()

6. To make the changes made by any SQL Queries permanently in database, which function is used after execution of the query?
(a) save()
(b) commit()
(c) execute()
(d) dump()

7. How is dynamic insertion of values achieved in SQL queries?
(a) Using execute()
(b) Using dynamicValues()
(c) Using '%s' format specifier or format()
(d) Using insertValues()

8. _____ it is a pointer or iterator which points towards the resultset of the SQL query.
(a) cursor
(b) rset
(c) temp
(d) None of these

9. To get all the records from result set, you may use _____.
(a) cursor.fetchmany()
(b) cursor.fetchall()
(c) cursor.fetchone()
(d) cursor.execute()

10. Which of the following is not a valid method to fetch records from database in python.
(a) fetchmany()
(b) fetchone()
(c) fetchmulti()
(d) fetchall()

11. Which attribute of cursor is used to get number of records stored in cursor (Assumeg cursor name is mycursor)?
(a) mycursor.count
(b) mycursor.row_count
(c) mycursor.records
(d) mycursor.rowcount

12. Which of the following package must be imported in Python to create a database connectivity application?
(a) mysql.connector
(b) mysql.connect
(c) sql.connector
(d) sql.execute

13. Which of the following method reflects the changes made in database permanently?
(a) <connection>.done()

(b) <connection>.final()
(c) <connection>.reflect()
(d) <connection>.commit()

14. Which method of cursor class is used to fetch limited rows from the table?
(a) cursor.fetchsize(SIZE)
(b) cursor.fetchmany(SIZE)
(c) cursor.fetchall(SIZE)
(d) cursor.fetchonly(SIZE)

15. Which method of cursor class is used to get the number of rows affected after any of the Insert/update/delete database operation executed from Python?
(a) cursor.rowcount
(b) cursor.getaffectedcount
(c) cursor.rowscount
(d) cursor.rcount

16. Which of the following component acts as a container to hold the data returned from the query:
(a) table
(b) cursor
(c) resultset
(d) container

17. To get the next record from the result set, we may use _____.
(a) cursor.fetch(next)
(b) cursor.fetchmany()
(c) cursor.fetchall()
(d) cursor.fetchone()

18. SQL command is passed to which function to run after establishment of the connection between python and database
(a) cursor()
(b) execute()
(c) connection()
(d) fetchall()

19. Which of the following function is used to close the connection between python and database?
(a) cursor.close()
(b) is.close()
(c) connection.close()
(d) execute.close()

20. Which is the correct statement about fetchone()
(a) Fetch the next row of a query result set, returning a single tuple, or None when no more data is available
(b) Fetch the First row of a query result set, returning a single tuple, or None when no more data is available
(c) Fetch the current row of a query result set, returning a single tuple, or None when no more data is available
(d) None of the above

Ans:

1	(b)
2	(c)

3 (b)
4 (a)
5 (c)
6 (b)
7 (c)
8 (a)
9 (b)
10 (c)
11 (d)
12 (a)
13 (d)
14 (b)
15 (a)
16 (c)
17 (d)
18 (b)
19 (c)
20 (a)

2 Marks Questions

1. Which method we use to establish the connection and clear the connection?
Ans: connect() and close() methods with connection object.

2. Which statement we use to access the MySQL module?
Ans: import mysql.connector

3. What are the difference between fetchone() and fetchmany()?
Ans: fetchone(): It will return one record from the result set.
fetchmany(n): It will return number of records as per value of n and by-default only one record.

4. How can you use Python with MySQL?
Ans: Python can be used with MySQL in a number of ways. One way is to use the mysql.connector python library, which is a MySQL driver written in Python. This library can be used to connect to a MySQL database and perform various operations, such as creating and executing SQL queries.

5. What is a cursor in the context of MySQL?
Ans: A cursor is a pointer that points to a specific location in a database table. In MySQL, cursors are used to iterate through the rows of a table and retrieve data from them.

6. What's the difference between autocommit and commit?
Ans: Autocommit is a database feature that automatically commits changes to the database as soon as they are made. This means that changes are immediately visible to other users and there is no need to explicitly call the commit() method. Commit, on the other hand, is a database feature that allows changes to be made to the database and then explicitly committed by the user. This allows the user to control when changes are made visible to other users.

7. How can you check if a table exists in MySQL?
Ans: You can check if a table exists in MySQL by using the SHOW TABLES command. This will show you a list of all the tables in the database. If the table you are looking for is not in the list, then it does not exist.

8. How do you disconnect from the database?

Ans: Use the close() method. db.close() closes the connection from the database, where db is connection object.

9. What is database connectivity?
Ans: Database connectivity refers to connection and communication between an application and a database system.

10. What is connection? What is its role?
Ans:A Connection (represented through a connection object) is the session between the application program and the database. To do anything with database, one must have a connection object.

3 Marks Questions

1. What is a result set? Give example with coding.
Ans: A result set refers to a logical set of records that are fetched from the database by executing a query and made available to the application-program.
Eg: myresult = mycursor.fetchall()

2. Which package must be imported in Python to create a database connectivity application? Give example with coding.
Ans:There are multiple packages available through which database connectivity applications can be created in Python. One such package is mysql.connector.PyMySQL, mysqlclient, etc. can also be used for connectivity.
Eg: import mysql.connector

3. Explain the following result retrieval methods:-
(a) fetchone()
(b) rowcount
(c) fetchall ()
Ans: (a) fetchone() :- The fetchone() method will return only one row from the result set in the form of tuple containing a record.
(b) rowcount() :- cursor.rowcount that always return how many records have been retrieved so for using any of the fetch..() methods.
(c) fetchall() :- The fetchall() method return all the rows from the result set in the form of a tuple congaing the records.

4. Write the python script to read the whole data from the table emp and display all the records.
Ans: import mysql.connector
```
mydb=mysql.connector.connect(host="localhost",user="root",passwd="root",database="school")
print (mydb)
mycursor=mydb.cursor()
numrow=mycursor.execute("select * from student")
print(mycursor.fetchall())
mydb.close()
```

5. Write the main difference among fetchone(),fetchmany() and fetchall().

Ans: fetchone() fetches a single record or row from the resultset.

fetchmany () method returns blocks of results according to a set limit. It will fetch n records at a time from the table.

fetchall() fetches all the records or rows at a time from the table.

4 Marks : Case Based Questions

1. The code given below inserts following record in to a table EMPLOYEE

EMPNO – Integer
ENAME – string
SALARY - Integer
BONUS - Integer
DEPTID – string

Help your friend Sonia in writing the following missing statements to complete the code:-

```
import _____ # Statement1
mydb=mysql.connector.connect(host="localhost",user="root",passwd='root',database="class12")
mycursor= _____ # Statement 2
mycursor.execute("INSERT INTO EMPLOYEE VALUES(114,'BP Singh',56400,800,'D01')")
_____ # Statement 3
print(mycursor.rowcount, "Record inserted")

_____ # Statement 4
```

Ans:

Statement 1: mysql.connector
Statement 2: mydb.cursor()
Statement 3: mydb.commit()
Statement 4: mydb.close()

2. Avni is trying to connect Python with MySQL for her project. Help her to write the python statement on the following:

i. Name the library, which should be imported to connect MySQL with Python.
ii. Name the function, used to run SQL query in Python.
iii. Name the function required to make the changes permanent.
iv. Name the fuction to clear the environment.

Ans:
i. mysql.connector
ii. execute()
iii. commit()
iv. close()

3. Your friend Jagdish is writing a code to fetch data from a database Shop and table name Products using Python. He has written incomplete code. You have to help him to write complete code:

```
import _____ as m # Statement-1
object1 = m.connect(host="localhost", user="root", password="root", database="Shop")
object2 = object1._____ # Statement-2
query = '"SELECT * FROM Products WHERE NAME LIKE "A%";'"
```

object2._____(query) # Statement-3
_____.close() # Statement-4

Ans:

Statement 1: mysql.connector
Statement 2: cursor()
Statement 3: execute()
Statement 4: object1

4. The code given below reads the following record from Table named Employee and display those record salary >= 30000 and <= 90000:
Empno – integer
EName – string
Desig – integer
Salary – integer
Note the following to establish connectivity between Python and MYSQL:
 Username is root
 Password is Password
 The table exists in a MYSQL database named Bank.

Write the following missing statements to complete the code on behalf of your friend Sandeep:
Statement 1 – to form the cursor object
Statement 2 – to query string.
Statement 3 - to execute the query that extracts records of those Employees whose salary >=30000 and <=90000.
Statement 4 - to close the connection.

```
import mysql.connector
mydb=mysql.connector.connect(host='localhost',user='root',passwd='Password',database='bank')
mycursor=_____ # statement1
mycursor._____ #statement 2
data= _____ # statement 3
for x in data:
        print(x)
_____ # statement 4
```

Ans:
Statement 1: mydb.cursor()
Statement 2: execute("'SELECT * FROM Employee WHERE salary >= 30000 and salary <= 90000;'")
Statement 3: mycursor.fetchall()
Statement 4: mydb.close()

5. The code given below inserts the following record in the table Emp:

Empno – integer
EName – string
Designation – integer
Salary – integer
Bonus - Integer
Note the following to establish connectivity between Python and MYSQL:

 Username is root
 Password is tiger
 The table exists in a MYSQL database named Employee.
 The details (Empno, EName, Designation, Salary and Bonus) are to be accepted from the user.

Help your friend in writing the following missing statements to complete the code:
Statement 1 – to create a connection
Statement 2 – to form the cursor object
Statement 3 – to execute the command that inserts the record in the table Emp.
Statement 4 - to add the record permanently in the database

```
import mysql.connector as mysql
def sql_data():
        mycursor=_____ #Statement 1
        eno=int(input("Enter Employee Number: "))
        Ename=input("Enter Employee Name: ")
        Designation=input("Enter Designation: "))
        Salary=int(input("Enter Salary: "))
        Bonus=int(input("Enter Bonus: "))
        querry="insert into emp values({},'{}',{},{})".format(eno,ename,designation,bonus)
        _____ #Statement 2
        _____ # Statement 3
        print("Employee Data Added successfully")
```

Ans:

Statement 1: con1= mysql.connect(host="localhost",user="root", password="tiger", database="Employee")
Statement 2: con1.cursor()
Statement 3: mycursor.execute(querry)
Statement 4: con1.commit()

5 Marks Questions

1. Write the steps to perform an Insert query in database connectivity application. Table Student values are rollno, name, age (10,'Ashok',26).

Ans: import mysql.connector as mydb

conn= mydb.connect(host="localhost", user="root", passwd="1234", database="school")

cur=conn.cursor()

cur.execute("INSERT INTO student values(10,'Ashok',26);")

cur.commit()

2. Observe the following python code and answer the questions:

import mysql.connector as _____#Statement 1

con = c.connect(host="localhost", user="root", passwd="", database="test")

mycursor= _____#Statement 2

mycursor.execute(" CREATE TABLE studentinfo (name VARCHAR (30), age INT(3)")

sql = """INSERT INTO studentinfo(name, age) VALUES ('Ashok',17) """

_____ #Statement 3

_____ #Statement 4

_____ #Statement 5

i) Write the python statement to give appropriate alias name in statement1.

ii) Write the python statement to establish the database cursor as statement2.

iii) Write the python statement to insert the row into the table as statement 3 by using the string 'sql' given above.

iv) Write the python statement to make the changes permanent.
v) Write the python statement to clear the environment.

Ans:

Statement 1: c
Statement 2: con.cursor()
Statement 3: mycursor.execute(sql)
Statement 3: mycursor.commit()
Statement 3: con.close()

3. Write the python function to accept the name as parameter and find out whether record present in the table or not. Table Student columns are rollno, name, age.

Ans:
```
import mysql.connector
def check_name(name):
    mydb=mysql.connector.connect(host="localhost",user="root",passwd="root",
    database="school")
    cur=mydb.cursor()
    cur.execute("select * from student")
    s=cur.fetchall()
    for k in s:
        if((k[1]==name)):
            print("Record Found",k)
            break
```

4. Observe the codes given below and fill in the blanks:-

```
_____# statement 1
mydb = mycon.connect( host="localhost", user="yourusername", password="yourpassword",
database="mydatabase" )
mycursor = mydb.cursor()
sql = "INSERT INTO customers (name, address) VALUES (%s, %s)"
val = ("John", "Highway No. 21")
mycursor.execute(sql, val)
_____ # statement 2
mycursor._____("SELECT * FROM customers") # statement 3
myresult = _____# statement 4
```

```
for x in myresult:
        print(x)
_________.close()  #statement 5
```

Ans:

Statement 1: import mysql.connector as mycon
Statement 2: mycursor.commit()
Statement 3: execute
Statement 4: mycursor.fetchall()
Statement 5: mydb

5. The Code given below is deleting a record from table EMPLOYEE.
Fill in the blanks to complete the code

```
import mysql.connector
mydb=_________(host="localhost",user="root",passwd='root',database="class12") #statement 1
mycursor=_____________ #statement 2
____________________("DELETE FROM EMPLOYEE WHERE EMPNO=114") # statement 3
_________________ # statement 4
_________________ # statement 5
```

Ans:

Statement 1: mysql.connector.connect
Statement 2 mydb.cursor()
Statement 3: mycursor.execute
Statement 4: mydb.commit()
Statement 5: mydb.close()

SAMPLE QUESTION PAPER-1

Subject: Computer Science (083)

Time: 3:00 Hrs Maximum Marks: 70

General Instructions:

- ***Please check this question paper contains 35 questions.***
- ***The paper is divided into 4 Sections- A, B, C, D and E.***
- ***Section A, consists of 18 questions (1 to 18). Each question carries 1 Mark.***
- ***Section B, consists of 7 questions (19 to 25). Each question carries 2 Marks.***
- ***Section C, consists of 5 questions (26 to 30). Each question carries 3 Marks.***
- ***Section D, consists of 2 questions (31 to 32). Each question carries 4 Marks.***
- ***Section E, consists of 3 questions (33 to 35). Each question carries 5 Marks.***
- ***All programming questions are to be answered using Python Language only.***

	SECTION – A	
1	Which of the following is not a valid Literal in Python: a) True b) 0x2B c) -2.5E-3 d) KVS	1
2	What will be the output of the python code given below: P = [20, 50] Q = [5, 8] P.extend(Q) print(P) a) [20, 50, 5, 8] b) [20, 50, [5, 8]] c) [20, 50] d) [5, 8, 20, 50]	1
3	Consider the following string declaration in python: S = 'PROCEDURE' Which of the following statements will produce output as 'RUDE'? a) print(S[4:8]) b) print(S[-2:3:-1]) c) print(S[-2:-6]) d) print(S[7:-5:-1])	1
4	Which of the following statement is false? a) Try block tests the excepted error to occur b) Except block handles the run time error c) Multiple except blocks cannot be associated to one try block d) Finally block always gets executed either exception is generated or not	1
5	Which of the following statement(s) will not create dictionary D? a) D = {2:2, 'A':'A'} b) D = {(2,):(2,),('A'):('A')} c) D = {[2]:[2], ['A']:['A']} d) D = {(2):[2], ('A'):['A']}	1
6	A binary file contains details of students in the form of list i.e [RollNo, Name, Age]. Which of the following method(s) will be used to read data from the binary file? a) load() b) read() c) readlines() d) reader()	1
7	Which of the following statement would give an error during execution of the following code? tup = (4, 'KVS', 5.5, 3) print(tup[2]+100) #Statement 1	1

	print(max(tup)) #Statement 2 print(tup.index(5.5)) #Statement 3 del tup #Statement 4 a) Statement 1 b) Statement 2 c) Statement 3 d) Statement 4	
8	Which of the following outcome is expected from the following code: import random SIDES = ('EAST','WEST','NORTH','SOUTH') N = random.randint(1,3) OUT="" for x in range (N,1,-1): OUT=OUT+SIDES[x] print(OUT) a) SOUTHNORTHWEST b) SOUTHNORTH c) NORTHWEST d) SOUTH	1
9	What will be the output of the following code? L = [2, 4, '2', 2.0, [2, 20], 'KV2'] print(L.count(2)) a) 1 b) 2 c) 3 d) 4	1
10	Expand the following terms: (i) POP3 (ii) SMTP	1
11	DROP in MySQL is which type of command? a) DDL b) DML c) DCL d) TCL	1
12	State True or False: “Mutable data types in python allows changes at the same memory location”	1
13	Consider the following python code: F = open('FILE.TXT') N = F.read(2) If FILE.TXT contains text as: 12BENGALURU What will be the data type of N? a) Integer b) Boolean c) String d) None	1
14	The syntax of seek() is given as follows: file_object.seek(offset [, reference_point]) If the value of reference_point is 2, then which of the following statement is correct? a) Value of offset must be positive b) Value of offset must be negative c) Value of offset can be positive or negative d) Value of offset must be zero	1
15	Which of the following statements is false? a) In circuit switching physical path is required between systems. b) Message switching data is first stored, then forwarded to the next node.	1

	c) In Message switching data is always divided into equal sized units before transmission. d) Internet uses packet switching technique.	
16	A _____ is a network device that connects two networks with different transmission protocols together. a) Gateway b) Bridge c) Switch d) NIC	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):- A python function that accepts parameters can be called without any parameters. Reasoning (R):- Functions can be defined with default values that are used, whenever corresponding values are not received in function call statement.	1
18	Assertion (A):- 'rb+' and 'wb+' are valid file modes for opening binary files. Reasoning (R):- Python supports simultaneous reading and writing in Binary files.	1
	SECTION – B	
19	Write at least two points of differences between Local Area Network(LAN) and Wide Area Network(WAN) **OR** Explain the following terms with examples: (i) URL (ii) Web Server	2 2

20	Rewrite the following code in Python after removing all the syntax errors. Underline each correction made by you in the code.
	num = 10
	for x in range[0, num]:
	if x in not [3, 5]:
	print(x*4)
	else if x = = 8:
	print(x+3)
	else:
	a =+ x
		2

21	Write a function display(PROD) in Python, that takes a dictionary PROD as an argument and increase the price by 10% of those products whose names contain exactly three characters, finally display the updated dictionary. Note: Dictionary PROD contains product names and prices as key and value pairs. For example if the dictionary is as follows: PROD = {'RAM':3000, 'MOUSE':250, 'KB':2500, 'HDD':4000} Then the output should be: {'RAM': 3300.0, 'MOUSE': 250, 'KB': 2500, 'HDD': 4400.0} **OR**	2

<table>
<tr><td></td><td>Write a Python Program to implement a function pallin(WORDS), that accepts a list of words as argument and display only those words which are palindrome.
For example if the list is as follows:
WORDS = ['RADAR', 'HAPPY', 'ROTATOR', 'NOON']
Then the output should be:
RADAR
ROTATOR
NOON</td><td>2</td></tr>
<tr><td>22</td><td>What will be the output of the following code?
def check(L, a=10):
for x in range(1, len(L)):
if L[x]%a == 0:
L[x-1] = L[x]-1
for z in range(0,len(L),2):
print(L[z], ' ' , L[z+1])
check([25, 40, 15, 25], 5)</td><td>2</td></tr>
<tr><td>23</td><td>Write single python statement to perform the following tasks:
(i) Given a tuple T = (('OM','JAI','SAAD'),('DELHI','MUMBAI','AGRA'))
Write python statement to display 2nd city name from the above tuple.
(ii) Given a list L = [1,2,3,4,5,6,7,8,9]
Write single python statement to remove elements from index 2 to 4
OR
Write single python statement to perform the following tasks:
Given a string S = "INDIA AND INDIANS ARE GREAT"
(i) Write python statement to display number of times ‘INDIA’ appears in the above string.
(ii) Write python statement to create a new string to add word ‘REMAIN’ in place of ‘ARE’ and display the string as:
INDIA AND INDIANS REMAIN GREAT</td><td>2

2</td></tr>
<tr><td>24</td><td>Jagdish has created a table in MySQL with the following specifications:
Table: FURNITURE
<table>
<tr><td>Field Name / Attribute</td><td>Data type</td></tr>
<tr><td>FID</td><td>INT(3)</td></tr>
<tr><td>FNAME</td><td>VARCHAR(20)</td></tr>
<tr><td>COST</td><td>FLOAT(7,2)</td></tr>
<tr><td>DISCOUNT</td><td>FLOAT(5,1)</td></tr>
<tr><td>QTY</td><td>INT(4)</td></tr>
</table>
Help Jagdish by writing SQL statements to perform the following tasks:
(i) Write SQL statement to remove column QTY from the table.
(ii) Write SQL statement to increase the value of DISCOUNT by 5% for all the rows.
OR
Differentiate between DDL and DML commands in SQL with appropriate examples.</td><td>2

2</td></tr>
</table>

25 | Consider the following two commands with reference to table EMP given below: | 2

Table: EMP

ENAME	QTR1	QTR2
JAI	5000	4000
HEPSIBA	NULL	6000
YOGESH	4000	0
UMA	3000	2000

(a) SELECT AVG(QTR1) FROM EMP;

(b) SELECT AVG(QTR2) FROM EMP;

If the above two commands are producing different results even though the sum values of columns QTR1 and QTR2 is same,

(i) What may be the possible reason?

(ii) What will be the output of commands (a) and (b)?

SECTION – C

26 | Predict the output of the Python code given below: | 3

```
data = ['P',20,'R',10,'S',30]
times = 0
alpha = ""
add = 0
for C in range(1,6,2):
    times = times + C
    alpha = alpha + data[C-1] + '$'
    add = add + data[C]
    print(times, add, alpha)
```

27 | Consider the tables given below:

Table : PARTICIPANTS

PNO	NAME
1	Anuradha Tariban
2	Jhon Fedricks
3	Kanti Desai

Table : EVENTS

EVENTCODE	EVENTNAME
1001	It Quiz
1002	Group Debate

(a) What will be the Cardinality and Degree of the cartesian product of above tables | 1

PARTICIPANTS X EVENTS | 2

(b) Write the output of the queries (i) to (iv) based on the table given below:

Table : TRAVEL

CNO	CNAME	TRAVELDATE	KMS	RATE
101	K. Niwal	2022-12-13	200	20
103	Fredrick Sym	2023-03-21	120	45
105	Hitesh Jain	2023-04-23	450	42

	102	Ravi Anish	2023-01-13	80	40
	107	Jhon Malina	2022-02-10	65	20

(i) SELECT CNO, KMS FROM TRAVEL WHERE RATE BETWEEN 40 AND 45;
(ii) SELECT CNAME FROM TRAVEL WHERE CNAME LIKE '%in%';
(iii) SELECT COUNT(DISTINCT RATE) FROM TRAVEL;
(iv) SELECT TRAVELDATE FROM TRAVEL WHERE KMS >= 200
ORDER BY TRAVELDATE;

28 Write a function COUNT() in Python to read from a text file 'rhym.txt' and display the count of words in each line. 3

Example: If the content of 'rhym.txt' is as follows:
Jack and jill
Went up the hill
To enjoy

Then the COUNT() function should display output as:
Line 1 : 3
Line 2 : 4
Line 3 : 2

OR

Write a function WE_WORDS() in Python to read from a text file 'TEXT.TXT' and display the count of words which starts with 'WE'. 3

Example: If the content of 'TEXT.TXT' is as follows:
WE MUST WELCOME ALL WEATHER FROM WEST

Then the WE_WORDS() function should display output as:
TOTAL WORDS STARTING WITH WE = 4

29 Consider the table FLIGHT given below: 3

Table: FLIGHT

FNO	ORIGIN	DESTINATION	FARE
F101	MUMBAI	CHENNAI	4500
F102	MUMBAI	BENGALURU	4000
F103	DELHI	CHENNAI	5500
F104	KOLKATA	MUMBAI	6500
F105	DELHI	BENGALURU	5000

Based on the above table, write SQL queries for the following:
(i) To change the fare to 6000 of the flight whose FNO is F104.
(ii) Delete the details of those flights whose destination is 'MUMBAI'.
(iii) To insert a row with the given data: ('F108','PUNE','CHENNAI',6800)

30 A list, NLIST contains following record as list elements: 3
[Customer_name, Mobile, City]
Each of these records are nested together to form a nested list. Write the following user defined functions in Python to perform the specified operations on the stack named 'STATUS'.
(i) PUSH_CUST(NLIST) – It takes the nested list as an argument and pushes a list object containing Customer_name and Mobile of customers whose City is 'BENGALURU'.

(ii) POP_CUST(): It pops all the objects from the stack 'STATUS' one by one and display them. Also, the function should display "Stack Empty" when there are no elements in the stack.

For example: If the nested list contains the following data:

```
NLIST = [['RAM SINGH', 9988776655, 'DELHI'] ,
         ['MEETA',9988776644,'BENGALURU'],
         ['JIYA',9988776633,'PUNE'],
         ['JAI',9988776622,'BENGALURU']]
```

Then the output should be:

```
['JAI', 9988776622]
['MEETA', 9988776644]
Stack Empty
```

SECTION – D

31 (4)

Consider the following tables STORE and SUPPLIERS and answer (b) and (c) parts of this question.

Table: STORE

ITEMNO	ITEM	SCODE	QTY	RATE	LASTBUY
1005	Sharpner	23	60	8	2021-12-02
1003	Ball Pen 0.25	22	50	25	2022-01-08
1002	Gel Pen Premium	21	150	12	2023-10-20
1006	Gel Pen Classic	21	250	20	2022-02-02
1001	Eraser Small	22	220	6	2022-08-24
1004	Eraser Big	22	110	8	2023-11-04
1009	Ball Pen 0.50	21	180	18	2022-10-10

Table: SUPPLIERS

SCODE	SNAME
21	Premium Stationers
23	Soft Plastics
22	Tetra Supply

Write SQL queries for the following:

(i) To display details of all items in the STORE table in ascending order of LASTBUY whose rate is more than 10.

(ii) To display ITEMNO, ITEM and SNAME of all the items.

(iii) To display the sum of quantity(QTY) for each supplier code (SCODE)

(iv) To display the names of all tables in the current database.

32 (4)

Ashutosh, a student of class XII wants to develop a project for his School. For that he has created a csv file Teachers.csv, to store the details of teachers. The csv file Teachers.csv contains records in the form of following list structure:

[TeacherID, TName, Subject]

Where

TeacherID is the Teacher's unique ID (integer)

TName is Teacher's name (string)

Subject is the name of subject taught by the teacher (string)

Ashutosh wants to write the following user defined functions:

(i) ADD() – to accept a record of teacher from the user and write it into the file Teacher.csv. The column headings should also be added on top of the csv file.

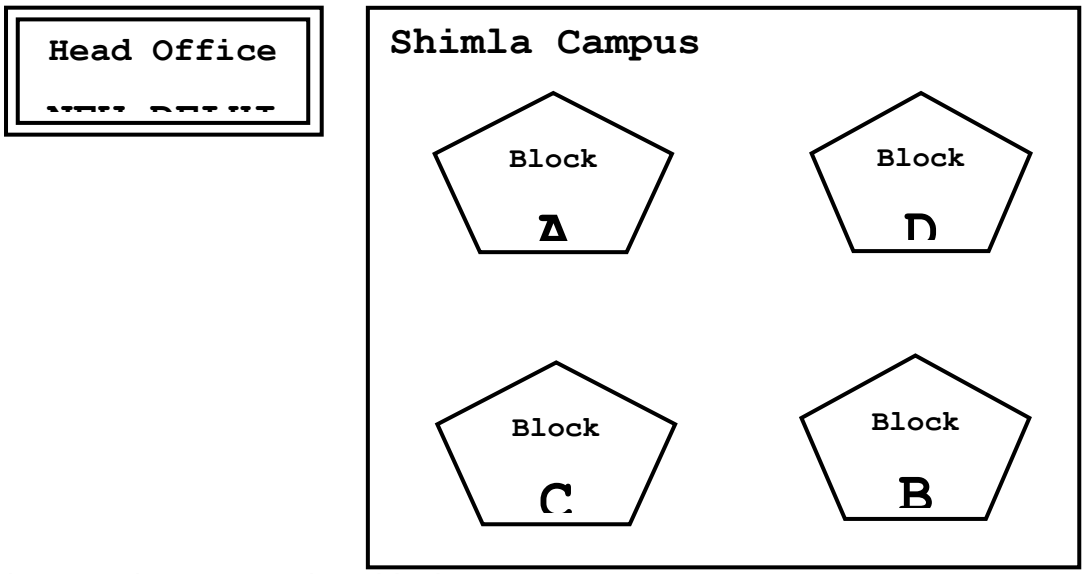
(ii) SEARCH(sub) – to display the names of teachers who teach the subject received as function parameter.

As a Python expert, help him complete the task.

SECTION - E

33 Sunder Publishing Pvt. Ltd. is setting up a secured network for their campus in the hilly area of Shimla for their day to day office and web based activities. They are planning to have connectivity in 4 buildings in the same campus and their head office situated in New Delhi. [5]

Answer questions (i) to (v) after going through the building positions in the campus and other details, which are given below:



Distances between various blocks

Block A to Block B	75 meters
Block A to Block C	50 meters
Block A to Block D	100 meters
Block B to Block C	60 meters
Block B to Block D	90 meters
Block C to Block D	125 meters

Number of Computers

Block A	25
Block B	50
Block C	20
Block D	120

(i) Suggest the most suitable place (i.e. Block) to house the server of this organisation. Also give reason to justify your suggested location.

(ii) Suggest an ideal wired cable layout of connections between the blocks inside the campus.

(iii) Suggest the placement of the following devices with justification:

- Switch
- Repeater

	(iv) The organisation is planning to provide link with its head office situated in NEW DELHI. Since, cable connection is not possible from Shimla, out of the following suggest the most suitable way to connect with its head office: • Microwave • Satellite • Infrared (v) Which topology is used in connecting computers in the blocks using switch.	
34	(i) What is the difference between text files and binary files? Which is faster in processing?	2
	(ii) Consider a binary file, HOSPITAL.DAT, containing records of the following structure: [PatientID, PatientName, Gender, WardNo, Doctor] Write a function, showPatients(doc) that reads content from the file HOSPITAL.DAT and display the records of those patients whose doctor is same as the value of doc received as parameter in the function. For example:- Assume that the binary file HOSPITAL.DAT contains following lists as records: [112, 'JITESH','M',5,'ROHIT'] [254, 'IMTIYAZ','M',1,'DEEPALI'] [412, 'KAYA','F',5,'ROHIT'] [212, 'KOYAL','F',2,'YASHVI'] If the function is called as - showPatients('ROHIT'), then the output should be: [112, 'JITESH','M',5,'ROHIT'] [412, 'KAYA','F',5,'ROHIT']	3
	OR	2
	(i) Write one point of similarity and one point of difference between 'w' and 'a' file modes of python? (ii) Consider a binary file, TEAMS.DAT, containing records of the following structure: [TeamName, no_won, no_lost] Write a function, BestTeams() that reads contents from the binary file TEAMS.DAT and display the records of those teams where no_won is more than no_lost. For example:- Assume that the binary file contains the following records: ['AUSTRALIA',20,18] ['SRILANKA',15,25] ['INDIA',25,10] ['ZIMBABWE',5,18] Then the output shown by the function BestTeams() should be: ['AUSTRALIA', 20, 18] ['INDIA', 25, 10]	3

35	(i) Write at least one point of difference between CHAR and VARCHAR data types of MySQL.	1
	(ii) Siya maintains a database named SCHOOL which contains a table named STUDENT with the structure given below:	4

	• RNO (Roll number)- integer(3)
	• SNAME (Student Name) – string
	• DOB (Date of Birth in format YYYY-MM-DD) – Date
	• PERCENT (Percentage) – float(6,2)
	Note the following to establish connectivity between Python and MySQL:
	• Username - root
	• Password - tiger
	• Host – localhost
	
	Help her to insert a student's record into the table STUDENT
	
	import _____ as ms #Statement 1
	con = ms.connect(host='localhost', user='root', passwd='tiger', database='SCHOOL')
	mcur = _____ #Statement 2
	choice = 'y'
	while choice in 'Yy':
	rn = int(input('Enter roll number : '))
	nm = input('Enter students name : ')
	dt = input('Enter date of birth YYYY-MM-DD : ')
	pr = float(input('Enter percentage : '))
	qry = 'INSERT INTO STUDENT VALUES(%s, %s, %s, %s);'
	val = (rn, nm, dt, pr)
	_____ #Statement 3
	choice = input('Enter more records y or Y for yes : ')
	_____ #Statement 4
	con.close()
	print('Records inserted OK !')
	
	With reference to the above code, answer the following questions:
	a) Fill in the blank at Statement 1 to import the required module.
	b) Write Statement 2 to create the cursor object.
	c) Write Statement 3 to run the query
	d) Write Statement 4 to save the changes in the table.	

	OR	
	(i) Define Primary Key	1
	(ii) Sohan maintains a database named COMPANY which contains a table named EMP with the structure given below: • ENO (Employee number)- integer(3) • ENAME (Employee Name) – string	4

	• DOJ (Date of joining in format YYYY-MM-DD) – Date
	• SALARY (Salary) – integer(6)
	Note the following to establish connectivity between Python and MySQL:
	• Username - root
	• Password - tiger
	• Host – localhost
	
	Help him to display all the records of table emp one by one.
	
	import _____ as ms #Statement 1
	con = ms.connect(host='localhost', user='root', passwd='tiger', database='COMPANY')
	_____ #Statement 2
	sal = int(input('Enter salary : '))
	qry = 'SELECT * FROM EMP WHERE SALARY >= {};'.format(per)
	_____ #Statement 3
	rows = _____ #Statement 4
	for r in rows:
	print(r)
	con.close()
	
	With reference to the above code, answer the following questions:
	a) Fill in the blank at Statement 1 to import the required module.
	b) Write Statement 2 to create the cursor object.
	c) Write Statement 3 to run the query.
	d) Write Statement 4 to retrieve all the records of the resultset.	

******** END ********

SAMPLE QUESTION PAPER - 2

Subject : Computer Science(083)

Maximum Marks : 70 **Time : 3:00 Hrs**

General Instructions:

- **Please check this question paper contains 35 questions.**
- **The paper is divided into 4 Sections- A, B, C, D and E.**
- **Section A, consists of 18 questions (1 to 18). Each question carries 1 Mark.**
- **Section B, consists of 7 questions (19 to 25). Each question carries 2 Marks.**
- **Section C, consists of 5 questions (26 to 30). Each question carries 3 Marks.**
- **Section D, consists of 2 questions (31 to 32). Each question carries 4 Marks.**
- **Section E, consists of 3 questions (33 to 35). Each question carries 5 Marks.**
- **All programming questions are to be answered using Python Language only.**

Q.No.	Question	Marks
	SECTION A	
1	State True or False: "Variable declaration is implicit in Python."	**1**
2	Which of the following types of table constraints will prevent the entry of duplicate rows? (A) Unique (B) Distinct (C) Primary Key (D) NULL	**1**
3	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	**1**
4	Select the correct output of the code: a = "Good bye 2022. Welcome 2023" a = a.split('0') b = a[1] + ". " + a[0] + ". " + a[2] print (b) (a) 22. Welcome 2. Good bye 2. 23 (b) Good bye 2. 2322. Welcome 2. (c) 22. Welcome 2. 232. Good bye (d) 22. Good bye 2. 23 Welcome 2.	**1**
5	In MYSQL database, if a table, EMPLOYEE has degree 5 and cardinality 4, and another table, DEPARTMENT has degree 3 and cardinality 3, what will be the degree and cardinality of the Cartesian product of EMPLOYEE and DEPARTMENT? (A) 5,3 (B) 8,12 (C) 12,8 (D) 4,3	**1**

6	Given the following dictionaries dict_exam={"Exam":"AISSCE", "Year":2023} dict_result={"Total":500, "Pass_Marks":165} Which statement will merge the contents of both dictionaries? (a) dict_exam.update(dict_result) (b) dict_exam + dict_result (c) dict_exam.add(dict_result) (d) dict_exam.merge(dict_result)	**1**
7	A network with all client computers and no server is called_____. (a) Networking (b) Peer to Peer network (c) Client Server network (d) Any of them	**1**
8	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	**1**
9	If a=1,b=2 and c= 3 then which statement will give the output as : 2.0 from the following: a) >>>a%b%c+1 b) >>>a%b%c+1.0 c) >>>a%b%c d) a%b%c-1	**1**
10	import random AR=[20,30,40,50,60,70] Lower=random.randint(1,3) Upper=random.randint(2,4) for K in range(Lower, Upper+1): print(AR[K], end="#") (a) **10#40#70#** (b) **30#40#50#** (c) **50#60#70#** (d) **40#50#70#**	**1**
11	Which of the following options can be used to read the first line of a text file data.txt? (a) F=open('data.txt') F.read() (b) F=open('data.txt','r') F.read(n) (c) F=open('data.txt') F.readline() (d) F=open('data.txt') F.readlines()	**1**
12	Fill in the blank _____is a communication methodology designed to deliver both voice and multimedia communications over Internet protocol. (a) VoIP (b) SMTP (c) PPP (d) HTTP	**1**

13	State whether the following statement is True or False: An exception may be raised even if the program is syntactically correct.	**1**
14	The correct syntax of seek() is: (a) file_object.seek(offset [, reference_point]) (b) seek(offset [, reference_point]) (c) seek(offset, file_object) (d) seek.file_object(offset)	**1**
15	Which function is used to display the total number of records from table in a database? (a) sum(*) (b) total(*) (c) count(*) (d) return(*)	**1**
16	Fill in the blank Bluetooth is an example of _____ (a) personal area network (b) local area network (c) virtual private network (d) wide area network	**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): A function is a block of organized and reusable code that is used to perform a single, related action. Reason (R): Function provides better modularity for your application and a high degree of code reusability	**1**
18	Assertion (A): Text file stores information in ASCII or unicode characters. Reason (R): In text file, there is no delimiter for a line.	**1**
	SECTION B	
19	How many pair of wires are there in twisted pair cable(Ethernet)?What is the name of port ,which is used to connect Ethernet cable to a computer or a labtop? OR Differentiate between static and dynamic website	**2**

20	Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.
	250 = Number
	WHILE Number<=1000:
	if Number=>750:
	print(Number)
	Number=Number+100
	else
	print(Number*2)
	Number=Number+50
		2

21	Write a function displayCity(CITIES) in Python, that takes the list, CITIES as an argument and displays the names (in uppercase)of the cities whose names are smaller than 7 characters. For example, Consider the following list CITIES=["Delhi","Kolkata","Mumbai","Bangalore","Pune"] The output should be Delhi Mumbai Pune OR Write a function countStudents(Scores) in Python, that takes the dictionary, Scores as an argument and displays the count of the students whose scores are greater than 70. For example, Consider the following dictionary Scores={'Reena':80,'Ajay':50,'Vijay':90,'Geeta':40,'Ritu':80,'Deepak':75} The output should be Count of students scoring>70 : 4	**2**

22	tup = ('geek',)
	n = 5
	for i in range(int(n)):
	  tup = (tup,)
	  print(tup)
		2

23	Write the Python statement for each of the following tasks: (a) to delete the element from beginning of the list 'L' (b) to insert the elements of list 'L1' as individual elements in list 'L' OR A list named employeeAge stores age of employees of computer department. Write the Python command to import the required module and (using built-in function) to display the most common age value from the given list.	**2**
24	Mr. Deepak has just created a table named "Products" containing columns Pcode, Pname, Price and Quantity. Mistakenly he has taken char datatype for the column "Quantity". Now he wants to change datatype for column "Quantity" to integer. Help him in writing the SQL command to make necessary change in the table "Products". Also, write the command to insert the following record in the table: Pcode- 3345 Pname- Chair Price: 500 Quantity: 100	**2**

OR

Ms. Kriti is working in a database named PLAYERS, in which he has created a table named "Sports" containing columns SportId, SportName, no_of_players, and category.
Now she wants to delete the attribute named "category"and insert a new attribute named "State" of data type string with default value "Punjab". Help Kriti to write the commands to complete both the tasks.

25 Predict the output of the following code **2**

```
def execute(x,y=200):
    temp=x+y
    print (temp,x,y)
a,b=50,20
execute(b)
execute(a,b)
execute(b,a)
```

SECTION C

26 **3**

```
Msg1="WeLcOME"
Msg2="GUeSTs"
Msg3=""
for I in range(0,len(Msg2)+1):
    if Msg1[I]>="A" and Msg1[I]<="M":
        Msg3=Msg3+Msg1[I]
    elif Msg1[I]>="N" and Msg1[I]<="Z":
        Msg3=Msg3+Msg2[I]
    else:
        Msg3=Msg3+"*"
print(Msg3)
```

27 Write output of the following SQL queries on the basis of following table. **3**

Table : Hospital

PName	Fee	Gender	Dateofvisit
Ramesh	200	M	2020-02-11
Mohnish	250	M	2019-12-22
Muskan	350	F	2019-11-22
Sunil	250	M	2018-12-02
Sonam	null	F	2019-01-19
Sahil	16950	F	2019-02-26

(i) Select * from hospital where pname like 'M%n' or pname like '%h%';
(ii) Select PName from hospital where dateofvisit bwteen '2018-12-01' and

	'2019-12-01' and Gender='M'; (iii) Select Pname,Fee from hospital where Fee>200 and gender='F';	
28	Define a function reverse() that reads the file "poem.txt" and prints the lines of the file in reverse order. OR Define a function numbers() that reads a text file "alphanumbers.txt" and prints numbers from it.	**3**
29	Consider the table College given below: Table : College No | Name | Age | Department | DOJ | Basic | Sex 1 | Shalaz | 45 | Biology | 13-02-88 | 10500 | M 2 | Sameera | 54 | Biology | 10-01-90 | 9500 | F 3 | Yagyen | 43 | Physics | 27-02-98 | 8500 | M 4 | Pratyush | 34 | Mathematics | 22-01-91 | 8500 | M 5 | Aren | 51 | Chemistry | 11-01-93 | 7500 | M 6 | Reeta | 27 | Chemistry | 14-02-94 | 9000 | F 7 | Urvashi | 29 | Biology | 10-02-93 | 8500 | F 8 | Teena | 35 | Mathematics | 02-02-89 | 10500 | F 9 | Viren | 49 | Mathematics | 03-01-88 | 9000 | M 10 | Prakash | 22 | Physics | 17-02-92 | 8000 | M (i) Write a query to change the Basic salary to 10500 of all those teachers from college, who joined the college after 01/02/89 and are above the age of 50 (ii) Write a query to display name and total salary (Basic + 40%of Basic) of all teachers . (iii) Write a query to delete the record of Viren from the table.	**3**
30	A list contains following record of a customer: [Customer_name, Phone_number, City] Write the following user defined functions to perform given operations on the stack named 'status': (i) Push_element() - To Push an object containing name and Phone number of customers who live in Goa to the stack (ii) Pop_element() - To Pop the objects from the stack and display them. Also, display "Stack Empty" when there are no elements in the stack. For example: If the lists of customer details are: ["Gurdas", "99999999999","Goa"] ["Julee", "8888888888","Mumbai"] ["Murugan","7777777777","Cochin"] ["Ashmit", "1010101010","Goa"] The stack should contain	**3**

	["Ashmit","1010101010"] ["Gurdas","9999999999"] The output should be: ["Ashmit","1010101010"] ["Gurdas","9999999999"] Stack Empty	

SECTION D

31 Consider the tables SHOPPE and ACCESSORIES given below: **4**

Table: SHOPPE

ID	SNAME	AREA
S01	ABC Computeronics	CP
S02	All Infotech Media	GK II
S03	Tech Shoppe	CP
S04	Geeks Tecno Soft	Nehru Place
S05	Hitech Tech Store	Nehru Place

Table : ACCESSORIES

No	Name	Price	Id
A01	Mother Board	12000	S01
A02	Hard Disk	5000	S01
A03	Keyboard	500	S02
A04	Mouse	300	S01
A05	Mother Board	13000	S02
A06	Keyboard	400	S03
A07	LCD	6000	S04
T08	LCD	5500	S05
T09	Mouse	350	S05
T10	Hard Disk	4500	S03

Write SQL queries for the following:

(i) To display Name and Price of all Accessories in ascending order of their Price

(ii) Display average price of Keyboard and Hard Disk

(iii) Display Name, Price of All Accessories and their respective SName, where they are available.

(iv) To display name of accessories whose price is greater than 1000 in descending order.

32 Gupta is writing a program to create a csv file "employee.csv" which will contain user name and password for department entries. He has written the following code. As a programmer, help him to successfully execute the given task. **4**

```
import ---------------- #statement 1
def add_emp(username,password):
   f=open('employee.csv', '----------') # statement 2
   content=csv.writer(f)
   content.writerow([username,password])
   f.close()
def read_emp( ):
   with open ('employee.csv','r') as file:
      content_reader=csv.------------------(file) # statement 3
```

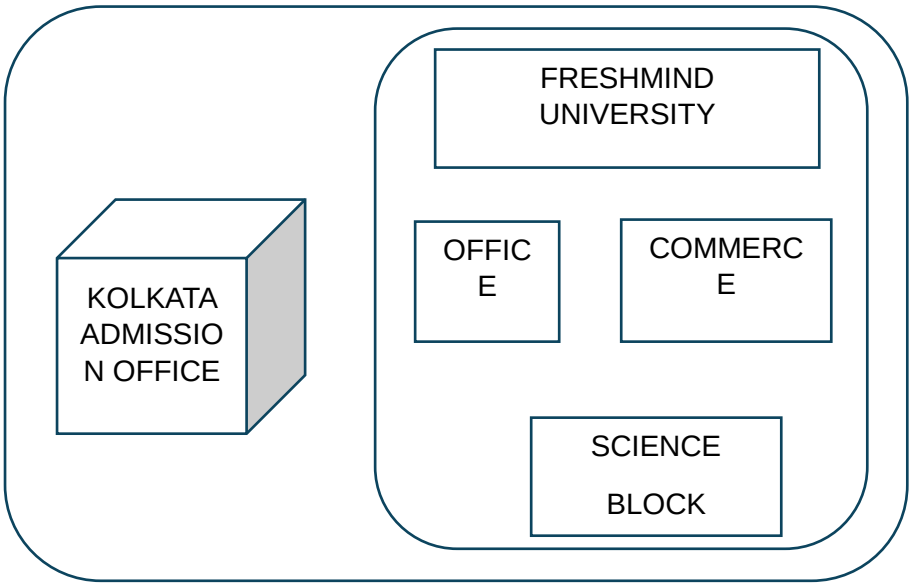
```
        for row in content_reader:
            print(row[0],row[1])
        file.close( )
add_emp('mohan','emp123#')
add_emp('ravi','emp456#')
read_emp() #statement 4
```

i. Name the module he should import in statement 1
ii. In which mode , Gupta should open the file to add record in to the file ? (statement 2)
iii. Fill in the blank in statement 3 to read the record from a csv file
iv. What output will he obtain while executing statement 4 ?

SECTION E

33 Freshminds University of India is starting its first campus Anna Nagar of South India with its centre admission office in Kolkata. The university has three major blocks comprising of Office Block, Science Block and Commerce Block in the 5 km area campus. **5**

As a network expert, you need to suggest the network plan as per (i) to (v) to the authorities keeping in mind the distance and other given parameters.



Expected distance between various locations

Office Block to Science Block	90 m
Office Block to Commerce Block	80 m
Science Block to Commerce Block	15 m
Kolkata Admission Office to Anna Nagar Campus	2450 km

Expected number of computers to install at various locations

Office Block	10
Science Block	140
Commerce Block	30

	Kolkata Admission Office | 8 i. Suggest the authorities, the cable layout amongst various blocks inside university campus for connecting the blocks ii. Suggest the most suitable place (i.e. block) to house the server of this university with a suitable reason. iii. Suggest an efficient device from the following to be installed in each of the blocks to connect all the computers. (a) Switch (b) Modem (c) Gateway iv. Suggest the most suitable (very high speed) service to provide data connectivity between Admission Office located in Anna Nagar from the following options: (a) Telephone lines (b) Fixed line dial-up connection (c) Co-axial cable network (d) GSM (e) Leased lines (f) Satellite v. Is there a requirement of a repeater in the given cable layout? Why/Why not?	
34	i. Differentiate 'wb+' and 'ab+' file modes in python ii. A binary file "STUDENT.DAT" has following structure [admission_no, Name, Percentage]. Write a function countrec() in Python that would read contents of the file "STUDENT.DAT" and copy the records of those students whose percentage is above 75 in the file "ABOVE75.DAT". Function should also return the no. of records copied. OR i. Which module is imported to read and write data into the binary files? Also name the methods to read and write data from binary files. ii. Write a function in python to search and display the details , whose destination is "Cochin" from binary file "Bus.Dat". Assuming the binary file is containing the following elements in the list: [BusNumber, BusStartingPoint, BusDestination]	**2+3=5**
35	i. Differentiate between fetchone() and fetchall() methods. ii. Reeta wants to create a small program in Python to insert a new record read from the user into the table named "student" in MYSQL database "SCHOOL". Table "Student" contains the following columns : Name – String DOB – Date Marks - Integer Note the following to establish the connectivity between Python and MYSQL. • Username – root • Password – 123 • Host - localhost	**2+3=5**

	Help Reeta in writing the program in python. OR i. Differentiate between Primary key and Unique key ii. Rakshit has created a table named "Employee" in MYSL database "Store" with following attributes: EmpNo – integer EmpName – string EmpDesig – string EmpSalary – float Note the following to establish the connectivity between Python and MYSQL. Username – abcd Password – tiger Host – localhost Now, he wants to view the details of employees whose salary is greater than 50000. Help him in writing the program in python.	

******** END ********

SAMPLE QUESTION PAPER - 3

Subject: Computer Science (083)

Time: 3:00 Hrs. **Maximum Marks: 70**

General Instructions:

- **Please check this question paper contains 35 questions.**
- **The paper is divided into 5 Sections- A, B, C, D and E.**
- **Section A, consists of 18 questions (1 to 18). Each question carries 01 Mark each.**
- **Section B, consists of 7 questions (19 to 25). Each question carries 02 Marks each.**
- **Section C, consists of 5 questions (26 to 30). Each question carries 03 Marks each.**
- **Section D, consists of 2 questions (31 to 32). Each question carries 04 Marks each.**
- **Section E, consists of 3 questions (33 to 35). Each question carries 05 Marks each.**
- **All programming questions are to be answered using Python Language only.**

SECTION A

1.	State True or False. "Identifiers are names used to identify a variable, function.	1
2.	Which of the following is a DDL command? (a) SELECT (b) ALTER TABLE (c) INSERT INTO (d) UPDATE	1
3.	What will be the output of the following statement? 10 > 5 and 7 > 12 or not 18>3	1
4.	What will be the output of the following Python Code? ANIMAL={"dog":10,"tiger":5,"elephant":15,"Cow":3} print("Tiger" not in ANIMAL) (a) True (b) False (c) Error (d) None	1
5.	What is the degree and cardinality of the following relation? Regno | Name | Class | Date_Admission 10001 | Sundar Raj | Class XII Science | 10/01/2020 10002 | Jay Shankar | Class X | 09/08/2021 10003 | Swaroop Rani | Class IX | 16/12/2016 1004 | Jayarani | Class XI | 23/06/20023 (a) 4, 5 (b) 5, 4 (c) 4, 4 (d) 4, 5	1
6.	---------- protocol provides access to command line interface on a remote computer. (a) FTP (b) PPP (c) SMTP (d) Telnet	1
7.	Which of the following will delete key-value pair for key = "Red" from a dictionary D1? (a) delete D1("Red") (b) del D1["Red"] (c) del.D1["Red"] (d) D1.del["Red"]	1
8.	Given is a Python list declaration : listofnames=["Aman","Ankit","Ashish","Rajan","Rajat"] Write the output of: print(listofnames[-1:-4:-1]) (a) ['Rajat', 'Rajan', 'Ashish'] (b) 'Ashish', 'Rajan', 'Rajat'] (c) ['Rajat', 'Rajan'] (d) None	1

9.	Which of the following statement(s) would give an error after executing the following code?
	S="Welcome to class XII" #Statement 1
	print(s) #Statement 2
	S="Thank You" #Statement 3
		1

	S[0]=”@” #Statement 4
	S=S +”Thank You” #Statement 5
	(a) Statement 3 (b) Statement 5 (c) Statement 4 (d) Statement 4&5	

10.	What are the possible output(s) expected from the following code? import random SIDES=("EAST","WEST","NORTH","SOUTH") OUT="" N=random.randint(1,3) for i in range(N,0,-1): OUT=OUT+SIDES[i] print(OUT) (a) SOUTHNORTH (b) SOUTHNORTHWEST (c) SOUTH (d) EAST WESTNORTH	1
11.	Which of the transmission media has the highest bandwidth? (a) Coaxial cable (b) Twisted pair cable (c) Fiber optic cable (d) None of these	1
12.	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)	1
13.	Exceptions are caught in ---------- (a) try block (b) except block (c) finally block (d) else block	1
14.	Referential Integrity is a rule that ensures _____ between records in related tables are valid. (a) Links (b) Difference (c)Relationship (d) Similarity	1
15.	_____ is a computer software capable of requesting, receiving & displaying information in the form of webpages. (a) Web Servers (b) Web Browsers (c) Web Site (d) Web Page	1
16.	Which of the following python statement will bring the read pointer to 10th character from the end of a file containing 100 characters, opened for reading in binary mode. (a) File.seek(10,0) (b) File.seek(-10,2) (c) File.seek(-10,1) (d) File.seek(10,2)	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	
17.	Assertion (A): Elements of a tuple cannot be changed after it has been created. Reason (R) : Tuple is an immutable data type.	1
18.	Assertion (A): Built in functions are predefined in the language that are used directly. Reason (R) : print() and input() are built in functions.	1
	SECTION B	
19.	(i) Expand the following terms: (a) HTTPS (b) WiFi (ii) Write any one difference between tree topology and star topology. **OR** (i) Define the term Protocol with respect to networks. (ii) How is Hub different from Switch?	1+1=2
20.	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:	2

	print(VAL*4) Elseif val%5==0: print(val+3) else print(VAL+10)	
21.	Write a function EOReplace() in Python, which accepts a list L of numbers. Thereafter it increments all even numbers by 1 and decrement all odd numbers by 1. **OR** Write a function CountW(S) in Python to return the number of words in a given string S.	2
22.	What will be the output of the following code? total=20 price=50 def add(a,b): global price total=a+b price=(a+b)/2 print(total,price) add(6,6) print(total,price)	2
23.	Write the Python statement for **each** of the following tasks using BUILT-IN functions/methods only: (i) To insert an element 100 at the Second position, in the list L1. (ii) To check whether all the characters in the string S1 are digits or not. OR How the pop( ) function is different from remove( ) function working withlist in python ? Explain with example.	1+1=2
24.	Mr.Shyam has created a FLIGHT table with FNO, START, REMARKS, FDATE and FARE with appropriate data type. Now he wants to delete the attribute REMARKS and to add a new column END with string data type and it should not contain NULL value. Please help Mr.Shyam to complete this task. **OR** Categorize the following commands as DDL and DML: INSERT, ALTER, DROP, DELETE, UPDATE, CREATE	2

25.	Predict the output of the following code:
	
	T = (9,18,27,36,45,54)
	T1 = tuple()
	for i in T:
	if i%6==0:
	T1=T1+(i,)
	print(T1)
		2

	SECTION C	

26.	Predict the output of the following Python Code given below:
	def Display(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()
		3

```
        else:
            if i%2==0:
                m=m+str[i-1]
            else:
                m=m+"#"
    print(m)
Display('Preboard 2@2023')
```

27. Consider the table SCHOOL and write the output of the SQL queries given below. — 1*3=3

TABLE: SCHOOL

COD	TEACHERNAM	SUBJ	DOJ	PERIODS	EXPERIENCE
1001	RAVI SHANKAR	ENG	12/03/2000	24	10
1009	PRIYA RAI	PHY	03/09/1998	26	19
1203	LISA ANAND	ENG	09/04/2000	27	5
1045	YASHRAJ	MAT	24/08/2000	24	15
1123	GANAN	PHY	16/07/1999	28	3
1167	HARISH B	CHE	19/10/1999	27	5
1215	UMESH	PHY	11/05/1998	22	16

(i) SELECT SUBJECT, SUM (PERIODS), SUBJECT FROM SCHOOL
GROUP BY SUBJECT;

ii) SELECT * FROM SCHOOL WHERE EXPERIENCE BETWEEN 12 AND 15;

iii) SELECT COUNT (DISTINCT SUBJECT) FROM SCHOOL;

28. Write a function in python to count the number of lines in a text file 'Country.txt' which are starting with an alphabet 'W' or 'H'. — 3

For example, If the file contents are as follows:
Whose woods these are I think I know.
His house is in the village though;
He will not see me stopping here
To watch his woods fill up with snow.
The output of the function should be:
W or w : 1
H or h : 2

OR

Write a user defined function to return the occurrence of the word 'you' present in a text file 'Quotes.txt' without using count() function.
For example if the file contents are as follows: Living a life you can be proud of doing your best Spending your time with people and activities that are important to you Standing up for things that are right even when it's hard Becoming the best version of you.

The countwords() function should display the output as:
Occurrence of the word 'you' : 3

29. Consider the table **STOCK** given below. — 1*3=3

ICODE	INAME	QTY	SUPPLIER	ROL
1	DDR1	160	DIGI SOFT	10
2	SSD 256GB	25	QUANTUM	5
3	WIRELESS MOUSE	125	NEHA PVT PVT	25
4	KEYBOARD 101 KEYS	100	DISC PVT LTD	25

Based on the given table, write SQL queries for the following:
(i) To increase the ROL by 5 of all the items whose quantity is more than 100
(ii) To display the all the items in the ascending order of quantity.
(iii) To insert a new record in to the above table. The respective column values are given below.
5,"PEN DRIVE",50,"JANVI COMPUTERS",25

30. Write a function in Python, Push(SItem) where , SItem is a dictionary containing the details of stationary items– {Sname:price}.
The function should push the names of those items in the stack who have price greater than 75. Also display the count of elements pushed into the stack.
For example: If the dictionary contains the following data:
3
9
Ditem={"Pen":106,"Pencil":59,"Notebook":80,"Eraser":25}
The stack should contain
Notebook
Pen
The output should be:
The count of elements in the stack is 2

3

SECTION D

31. Consider the Doctor and Patient table and write the output of (i) to (iv)

Doctor

docid	Dname	Specialization	Outdoor
D1	MANISH	PHYSICIAN	MONDAY
D2	PARESH	EYE	FRIDAY
D3	KUMAR	ENT	SATURDAY
D4	AKASH	ENT	TUESDAY

Patient

Pid	Pname	did	Date_visit
P1	Lal singh	D2	2022-04-25
P2	Arjun	D1	2022-05-05
P3	Narender	D4	2022-03-13
P4	Mehul	D3	2022-07-20
P5	Naveen	D2	2022-05-18
P6	Amit	D1	2022-01-22

(I) select count(*) from patient where date_visit like '%2_';

(II) select specialization ,count(*) from doctor group by specialization;

(III) select a.dname, b.pname from doctor a, patient b where a.docid=b.did;

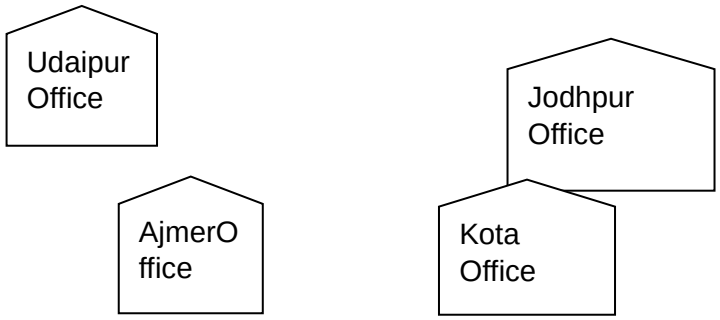
(IV) select dname from doctor,patient where docid=did and pname='Arjun';

1*4=4

32. A csv file " result.csv" contains record of student in following order
[rollno, name, sub1,sub2,sub3,total]

Initially student total field is empty string as example data is given below

2=2=

	['1', 'Anil', '40', '34', '90', ''] ['2', 'Sohan', '78', '34', '90', ''] ['3', 'Kamal', '40', '45', '9', ''] A another file "final.csv" is created which reads records of "result.csv" and copy all records after calculating total of marks into final.csv. The contents of final.csv should be ['1', 'Anil', '40', '34', '90', '164'] ['2', 'Sohan', '78', '34', '90', '202'] ['3', 'Kamal', '40', '45', '9', '94'] (a) Define a function createcsv() that will create the result.csv file with the sample data given above. (b) Define a function copycsv() that reads the result.csv and copy the same data after calculating total field into final.csv file.	4
	SECTION E	
33.	Laxmi Marketing Ltd. has four branches in its campus named Udaipur, Kota, Jodhpur and Ajmer. Laxmi Marketing Ltd. wants to establish the networking between all the four offices. A rough layout of the same is as follows:  Approximate distances between these offices as per network survey team are as follows: **Place From** / **Place To** / **Distance** Udaipur / Jodhpur / 30 m Jodhpur / Kota / 40 m Kota / Ajmer / 25 m Udaipur / Ajmer / 150 m Jodhpur / Ajmer / 105 m Udaipur / Kota / 60 m In continuation of the above, the company experts have planned to install the following number of computers in each of their offices: Udaipur 40 Jodhpur 80 Kota 200 Ajmer 60 i. Suggest the most suitable place (i.e., Block/Center) to install the server of this organization with a suitable reason.	1*5=5

	ii. Suggest an ideal layout for connecting these blocks/centers for a wired connectivity. iii. Which device will you suggest to be placed/installed in each of these offices to efficiently connect all the computers within these offices? iv. Suggest the placement of a Repeater in the network with justification. v The organization is planning to connect its new office in Delhi, which is more than 1250 km current location. Which type of network out of LAN, MAN, or WAN will be formed? Justify your answer.	
34.	(i) Differentiate between rb+ and wb+ file modes in Python. (ii) Consider a binary file "**employee.dat**" containing details such as**(empno, ename, salary) .** Write a python function to display details of those employees who are earning between 20000 and30000 (both values inclusive). **OR** (i) Differentiate between dump and load functions in binary files? (ii) Write a Python function in Python to search the details of the employees **[name, designation, salary]** whose salary is greater than 5000. The records are stored in the file "**emp.dat"**. consider each record in the file emp.dat as a list containing name, designation and salary.	2+3=5
35.	(i) How many candidate key and primary key a table can have in a Database? (ii) Manish wants to write a program in Python to create the following table named "EMP" in MYSQL database, ORGANISATION: Eno (Employee No)- integer Ename (Employee Name) - string Edept (Employee Department)-string Sal (salary)-integer Note the following to establish connectivity between Python and MySQL: Username – root , Password – admin , Host - localhost The values of fields eno, ename, edept and Sal has to be accepted from the user. Help Manish to write the program in Python to insert record in the above table. **OR** (i) Differentiate between degree & cardinality key in RDBMS? (ii) Vihaan wants to write a program in Python to create the following table named "EMP" in MYSQL database, ORGANISATION: Eno (Employee No)- integer Ename (Employee Name) - string Edept (Employee Department)-string Sal (salary)-integer Note the following to establish connectivity between Python and MySQL: Username – root , Password – admin , Host - localhost Help Vihaan to write the program in Python to Alter the above table with new column named Bonus (int).	1+4=5

******** END ********