

CBSE 2026 Class 12 Computer Science

Question Paper with Solutions

Conducted by Central Board of Secondary Education (CBSE)



General Instructions

- (i) This question paper contains **37 questions**.
- (ii) All questions are **compulsory**. However, internal choices have been provided in some questions. Attempt only one of the choices in such questions.
- (iii) The paper is divided into 5 Sections - **A, B, C, D** and **E**.
- (iv) Section **A** consists of **21** questions (1 to 21). Each question carries **1 mark**.
- (v) Section **B** consists of **7** questions (22 to 28). Each question carries **2 marks**.
- (vi) Section **C** consists of **3** questions (29 to 31). Each question carries **3 marks**.
- (vii) Section **D** consists of **4** questions (32 to 35). Each question carries **4 marks**.
- (viii) Section **E** consists of **2** questions (36 & 37). Each question carries **5 marks**.

SECTION – A

1. State True or False :

In Python, data type of 74 is same as the data type of 74.0.

Correct Answer: False

Solution:

In Python, numbers without a decimal point are considered to be of type `int` (integer). Therefore, the data type of 74 is `int`.

On the other hand, numbers containing a decimal point are evaluated as `float` (floating-point).

Hence, the data type of `74.0` is **float**.

Since they belong to entirely different data types, the given statement evaluates to **False**.

2. Identify the output of the following code snippet :

```
s = "the Truth"
print(s.capitalize())
```

- (A) The truth
- (B) THE TRUTH
- (C) The Truth
- (D) the Truth

Correct Answer: (A) The truth

Solution:

The `capitalize()` string method in Python returns a copy of the string where only its first character is capitalized (converted to uppercase), and all the remaining characters are converted to lowercase.

- **Step 1:** The original string is "the Truth".
- **Step 2:** The first character 't' is converted to uppercase 'T'.
- **Step 3:** The rest of the string "he Truth" is converted to entirely lowercase "he truth".

Therefore, combining them predictably gives the final output: "The truth".

3. Which of the following expressions in Python evaluates to True ?

- (A) `2>3` and `2<3`
- (B) `3>1` and `2`
- (C) `3>1` and `3>2`
- (D) `3>1` and `3<2`

Correct Answer: (C) $3 > 1$ and $3 > 2$

Solution:

Let's evaluate each logical expression step-by-step. The `and` operator strictly returns `True` only if both operands evaluate to `True`.

(A) $2 > 3$ and $2 < 3 \Rightarrow \text{False}$ and `True` \Rightarrow **False**

(B) $3 > 1$ and `2` \Rightarrow `True` and `2` \Rightarrow **2** (This evaluates to truthy, but its evaluated outcome is the integer 2, not explicitly the boolean `True`).

(C) $3 > 1$ and $3 > 2 \Rightarrow \text{True}$ and `True` \Rightarrow **True** (This evaluates explicitly to the boolean `True`).

(D) $3 > 1$ and $3 < 2 \Rightarrow \text{True}$ and `False` \Rightarrow **False**

Thus, expression (C) is the one that correctly evaluates to `True`.

4. What is the output of the following code snippet ?

```
s = 'War and Peace by Leo Tolstoy'  
print(s.partition("by"))
```

- (A) ('War and Peace ', 'by', ' Leo Tolstoy')
- (B) ['War and Peace ', 'by', ' Leo Tolstoy']
- (C) ('War and Peace ', ' Leo Tolstoy')
- (D) ['War and Peace ', ' Leo Tolstoy']

Correct Answer: (A) ('War and Peace ', 'by', ' Leo Tolstoy')

Solution:

The `partition()` method splits the string at the first occurrence of the specified separator, and returns a 3-tuple containing:

- The part before the separator.
- The separator itself.
- The part after the separator.

Here, separating by "by" creates the tuple ('War and Peace ', 'by', ' Leo Tolstoy')

Tolstoy').

5. What will be the output of the following statement ?

```
print("PythonProgram"[-1:2:-2])
```

Solution:

The string slice [-1:2:-2] means: start at the last character (index -1), go up to index 2 (exclusive), moving backwards by a step of -2.

- **Step 1:** Index -1 is 'm'.
- **Step 2:** Index -3 is 'r'.
- **Step 3:** Index -5 is 'o'.
- **Step 4:** Index -7 is 'P'.
- **Step 5:** Index -9 is 'o'.

It stops before reaching index 2. The output is `mroPo`.

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

```
t = tuple('tuple')
t2 = t[2],
t += t2
print(t)
```

- (A) ('tuple')
- (B) ('tuple', 'p')
- (C) ('t', 'u', 'p', 'l', 'e', 'p')
- (D) ('t', 'u', 'p', 'l', 'e')

Correct Answer: (C) ('t', 'u', 'p', 'l', 'e', 'p')

Solution:

- **Step 1:** `t = tuple('tuple')` creates a tuple ('t', 'u', 'p', 'l', 'e').
- **Step 2:** `t[2]` is 'p'. Thus `t2 = 'p'`, creates a single-element tuple ('p',).
- **Step 3:** `t += t2` concatenates them, resulting in ('t', 'u', 'p', 'l', 'e', 'p').

7. Which of the following statements is true about dictionaries in Python ?

- (A) A dictionary is an example of sequence datatype.
- (B) A dictionary cannot have two elements with same key.
- (C) A dictionary cannot have two elements with same value.
- (D) The key and value of an element cannot be the same.

Correct Answer: (B) A dictionary cannot have two elements with same key.

Solution:

In Python dictionaries, keys must be unique. If a value is assigned to an already existing key, it overwrites the previous value. Dictionaries can have duplicate values and the key and value can be the same, but duplicate keys are strictly not allowed.

8. If L is a list with 6 elements, then which of the following statements will raise an exception ?

- (A) `L.pop(1)`
- (B) `L.pop(6)`
- (C) `L.insert(1,6)`
- (D) `L.insert(6,1)`

Correct Answer: (B) L.pop(6)

Solution:

A list L with 6 elements has valid indices from 0 to 5. The `pop()` method removes and returns the element at the given index. Passing 6 will raise an **IndexError** because it is out of bounds. The `insert()` method does not raise an exception for out-of-bounds indices; it simply appends.

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

```
def f1(a,b=1):  
    print(a+b,end='-')  
c=f1(1,2)  
print(c,sep='*')
```

- (A) 3-2
- (B) 3-2*
- (C) 3-None
- (D) 3*None-

Correct Answer: (C) 3-None

Solution:

- **Step 1:** Calling `f1(1,2)` passes `a=1`, `b=2`. The function prints `a+b` (which is 3) with `end='-'`, so it prints `3-`.
- **Step 2:** The function does not have a return statement, so it returns `None`, assigning `None` to `c`.
- **Step 3:** The outermost `print(c,sep='*')` prints `None`.

Combined, the output displayed on the console is **3-None**.

10. Consider the statement given below :

```
f1 = open("pqr.dat", "_____")
```

Which of the following is the correct file mode to open the file in read only mode ?

- (A) a
- (B) rb
- (C) r+
- (D) rb+

Correct Answer: (B) rb

Solution:

The extension of the file is .dat, denoting a binary data file. To open a binary file in read-only mode, the correct file mode is **rb** (read binary).

11. State whether the following statement is True or False :

In Python, Logical errors can be handled using `try...except...finally` statement.

Correct Answer: False

Solution:

The `try...except...finally` statement is specifically used to handle **runtime errors** (Exceptions) during program execution. Logical errors (flaws in algorithm logic) do not raise exceptions and must be manually debugged by the programmer.

12. A table has two candidate keys, one of which is chosen as the primary key. How many alternate keys does this table have ?

- (A) 0
- (B) 1
- (C) 2
- (D) 3

Correct Answer: (B) 1

Solution:

By definition, **Alternate Keys** are those candidate keys which are not chosen as the primary key. Since there are 2 candidate keys and 1 is chosen as the primary key, the remaining $2 - 1 = 1$ key becomes the alternate key.

13. Which of the following SQL command can change the degree of the existing relation ?

- (A) DROP TABLE
- (B) ALTER TABLE
- (C) UPDATE . . . SET
- (D) DELETE

Correct Answer: (B) ALTER TABLE

Solution:

The **degree** of a relation refers to the number of columns (attributes) it has. To change the degree (i.e. to add or drop a column), we must alter the structure of the existing table using the **ALTER TABLE** SQL command.

14. What will be the output of the query ?

```
SELECT MACHINE_ID, MACHINE_NAME FROM INVENTORY
WHERE QUANTITY <= 100;
```

- (A) All columns of INVENTORY table with quantity greater than 100
- (B) ID and name of machines with quantity less than 100 from INVENTORY table
- (C) All columns of INVENTORY table with quantity greater than or equal to 100
- (D) ID and name of machines with quantity less than or equal to 100 from INVENTORY table.

Correct Answer: (D) ID and name of machines with quantity less than or equal to 100 from INVENTORY table

Solution:

The `SELECT MACHINE_ID, MACHINE_NAME` clause projects the ID and name columns. The `WHERE QUANTITY <= 100` clause filters the rows to specifically include only machines that possess a quantity less than or precisely equal to 100.

15. A relation in MySQL database consists of 2 tuples and 3 attributes. If 2 attributes are deleted and 4 tuples are added, what will be the cardinality of the relation ?

- (A) 4
- (B) 5
- (C) 6
- (D) 7

Correct Answer: (C) 6

Solution:

The **cardinality** of a relation refers to its total number of tuples (rows). The number of attributes (columns) does not affect the cardinality. Initially, the relation has 2 tuples. Adding 4 new tuples brings the total cardinality to $2 + 4 = 6$.

16. Which aggregate function in SQL returns the smallest value from a column in a table ?

- (A) `MIN()`
- (B) `MAX()`
- (C) `SMALL()`
- (D) `LOWER()`

Correct Answer: (A) `MIN()`

Solution:

In SQL, the `MIN()` aggregate function evaluates all queried rows and returns the numerically

or alphabetically smallest value stored in a specified database column.

17. With respect to computer networks, which of the following is the correct expanded form of RJ 45 ?

- (A) Radio Jockey 45
- (B) Registered Jockey 45
- (C) Radio Jack 45
- (D) Registered Jack 45

Correct Answer: (D) Registered Jack 45

Solution:

In the context of computer networking, an **RJ45** connector is a commonly used standard physical interface for terminating twisted pair type cables. RJ literally stands for **Registered Jack**.

18. Which network device serves as the entry and exit point of a network, as all data coming in or going out of a network must first pass through it in order to use routing paths ?

- (A) Modem
- (B) Gateway
- (C) Switch
- (D) Repeater

Correct Answer: (B) Gateway

Solution:

A **Gateway** acts exactly as an entry/exit checkpoint (a "gate") joining two or more disparate networks together, directing data routing paths out of the local network topology and into outside topologies like the internet.

19. Expand the term XML.

Q. Nos. 20 and 21 are Assertion (A) and Reason (R) based questions. Mark the correct choice as :

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

20. **Assertion (A)** : `[1, 2, 3] + '123'` is an invalid expression in Python.

Reason (R) : In Python, a list cannot be concatenated with a string.

Correct Answer: (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation for Assertion (A).

Solution:

The + operator in Python requires both operands to be of the exact same sequence type to concatenate. A list `[1, 2, 3]` cannot be appended with string `'123'`, which raises a `TypeError`. This makes the expression invalid, proving both statements true and structurally explaining the reasoning context.

21. **Assertion (A)** : The PRIMARY KEY constraint in SQL ensures that each value in the column(s) is unique and cannot be NULL.

Reason (R) : Candidate keys are not eligible to become a primary key.

Correct Answer: (C) Assertion (A) is true, but Reason (R) is false.

Solution:

The assertion is factual: a PRIMARY KEY dictates uniqueness and enforces a strict NOT NULL

constraint on a column. However, the reason provided is false; candidate keys are **precisely** the group of eligible keys from which the database designer selects one key to serve as the primary key.

SECTION – B

22. What is the difference between default parameters and positional parameters in Python ? Also give an example of a function header which uses both.

Solution:

- **Default Parameters:** These are parameters initialized with a default value in the function header itself. They become optional when the function is called.
- **Positional Parameters:** Standard parameters without default assigned values. When the function is called, arguments must be supplied for these in the exact designated order or position.

Example:

```
def calculate(a, b=5):    # a is positional, b is default
    return a + b
```

23. Write a Python statement to perform the following tasks : (USE BUILT_IN FUNCTIONS / METHODS ONLY)

- (i) To create a new list L1 containing the elements of list L arranged in ascending order, without modifying list L.
- (ii) A statement to check whether the given character, ch is an alphabet or a number.

Solution:

- (i) To create a strictly sorted new list without mutating the original:

```
L1 = sorted(L)
```

- (ii) To check via boolean if a char is alphanumeric:

```
ch.isalnum()
```

24. Assuming that D1 is a dictionary in Python,

- (i) (a) Write a Python expression to check if the key, 'RNo' is present in D1.

OR

- (b) Write a Python expression to check if any key in D1 has a value 12.

- (ii) (a) Write a single statement using a BUILT_IN function to add the key : value pair 'RNo' : 12, if the key 'RNo' is not present in D1. However, if the key 'RNo' is present, the function should return its value.

OR

- (b) Write a single statement to delete all the elements from D1.

Solution:

- (i) (a) 'RNo' in D1

OR

- (b) 12 in D1.values()

- (ii) (a) D1.setdefault('RNo', 12)

OR

- (b) D1.clear()

25. What possible output(s) from the given options will NOT be displayed when the following code is executed ? Also, mention, for how many iterations the for loop in the given code will run ?

```
import random
a = [1,2,3,4,5,6]
for i in range(4):
    j = random.randrange(i,5)
    print(a[j],end='-')
print()
```

Options :

- (A) 3-4-5-4-
- (B) 2-2-4-5-
- (C) 4-3-3-5-
- (D) 5-1-2-4-

Correct Answer: (D) 5-1-2-4-

Solution:

The for loop runs **4 times** (i.e. for $i = 0, 1, 2, 3$). In each iteration, j is generated as a random integer between i and 4 (inclusive). This accesses array elements $a[j]$.

- For $i=0$, j is in $[0, 4]$, mapping to array values 1, 2, 3, 4, 5.
- For $i=1$, j is in $[1, 4]$, mapping to array values 2, 3, 4, 5.
- For $i=2$, j is in $[2, 4]$, mapping to array values 3, 4, 5.
- For $i=3$, j is in $[3, 4]$, mapping to array values 4, 5.

In option (D), the second output character is 1, which requires $j=0$. However, during the second loop iteration ($i=1$), j cannot be 0. Thus, this sequence is entirely impossible.

26. The function given below is written to accept a string s as a parameter and return the number of vowels appearing in the string. The code has certain errors. Observe the code carefully and rewrite it after removing all the logical and syntax errors. Underline all the corrections made.

```
def CountVowels(s):
    c=0
    for ch in range(s):
        if 'aeiouAEIOU' in ch:
            c+=1
    return(ch)
```

Solution:

```
def CountVowels(s):
    c=0
    for ch in s:                # Corrected 'range(s)' to 's'
        if ch in 'aeiouAEIOU': # Corrected condition logic
            c += 1              # Corrected assignment to 'c += 1'
    return c                    # Corrected return statement
```

27. Ms. Zoya is a Production Manager in a factory which packages mineral water. She decides to create a table in a database to keep track of the stock present in the factory. Each record of the table will have the following fields :

W_Code – Code of the item (type – CHAR(5))

W_Description – Description of the item (type – VARCHAR(20))

B_Qty – Balance quantity of the item (type – INTEGER)

U_Price – Unit Price of the item (type – FLOAT)

The name of the table is W_STOCK.

(i) (a) Write an SQL command to create the above table (W_Code should be the primary key).

OR

(b) Can U_Price be the primary key of the above table ? Justify your answer.

(ii) (a) Assuming that the table W_STOCK is already created, write an SQL command to add an attribute E_Date (of DATE type) to the table.

OR

- (b) Assuming that the table W_STOCK is already created, write an SQL command to remove the column B_Qty from the table.

Solution:

(i) (a) `CREATE TABLE W_STOCK (W_Code CHAR(5) PRIMARY KEY, W_Description VARCHAR(20), B_Qty INTEGER, U_Price FLOAT);`

OR

(b) **No**, U_Price cannot be the primary key because prices are generally non-unique and multiple completely different packaged water items could technically share identical pricing.

(ii) (a) `ALTER TABLE W_STOCK ADD E_Date DATE;`

OR

(b) `ALTER TABLE W_STOCK DROP B_Qty;`

28.

- (a) List one advantage and one disadvantage of Bus topology.

OR

- (b) What is protocol in the context of computer networks? Which protocol is used to transmit hypertext across the web?

Solution:

(a) **Advantage:** It's extremely simple to deploy and minimal cabling is required to connect nodes.

Disadvantage: If the central backbone cable is severed or fails, all network nodes instantly experience full downtime.

OR

(b) A **protocol** is defined as a standard set of mathematical or data communication rules governing exactly how information is transmitted and interpreted digitally over a network. The protocol governing hypertext transfer across the web is **HTTP** (or **HTTPS**).

SECTION – C

29.

- (a) Write a Python function that counts and returns the number of digits appearing in the text file "Space.txt". For example, if the file contains :

```
Space exploration has unlocked incredible
advancements in technology and science. Since the
first moon landing in 1969, space agencies have sent
probes to Mars, Jupiter and beyond. The ISS,
orbiting Earth at about 400 km, serves as a hub for
research. With missions planned for 2030, humanity's
cosmic journey continues!
```

Then the function should return 11.

OR

- (b) Write a Python function that displays the words in which the lowercase letter 'e' appears at least twice in the text file 'Space.txt'. For example, if the file contains :

```
Space exploration has unlocked incredible
advancements in technology and science. Since the
first moon landing in 1969, space agencies have sent
probes to Mars, Jupiter and beyond. The ISS,
orbiting Earth at about 400 km, serves as a hub for
research. With missions planned for 2030, humanity's
cosmic journey continues!
```

Then the function should display :

incredible advancements science. agencies serves research.

Solution:

(a)

```
def count_digits():
    with open("Space.txt", "r") as f:
        data = f.read()
        count = 0
        for ch in data:
            if ch.isdigit():
                count += 1
        return count
```

OR

(b)

```
def count_e_words():
    with open("Space.txt", "r") as f:
        words = f.read().split()
        for w in words:
            if w.count('e') >= 2:
                print(w, end=' ')
```

30.

(a) A stack named FruitStack, implemented using list, contains records of some fruits. Each record is represented as a dictionary with keys 'Name', 'Origin', 'Price', and 'Expiry'. A sample record is given here :

```
{'Name': 'Apple', 'Origin': 'France', 'Price': 120, 'Expiry': '12-08-2025'}
```

Write the following user-defined functions in Python to perform the specified operations on FruitStack :

(i) `push_fruit(FruitStack, Fruit)` : This function takes the stack FruitStack and a

new record Fruit as arguments and pushes the record stored in Fruit onto FruitStack if the Price is less than 100.

(ii) `pop_fruit(FruitStack)` : This function pops the topmost record from the stack and returns it. If the stack is already empty, the function should display "UNDERFLOW".

(iii) `display(FruitStack)` : This function displays all the elements of the stack starting from the topmost element. If the stack is empty, the function should display 'EMPTY STACK'.

OR

(b) Write a Python program to accept 10 integers from the user. If the entered number is a three-digit even integer, push it onto a stack. After all inputs are taken, pop all the three-digit even integers from the stack and display them. For example, if the user enters 12, 31, 320, 457, 6, 92, 924, 220, 1, 218, then the stack should contain :

320, 924, 220, 218

and the output of the program should be :

218 220 924 320

Solution:

(a)

```
def push_fruit(FruitStack, Fruit):
    if Fruit['Price'] < 100:
        FruitStack.append(Fruit)

def pop_fruit(FruitStack):
    if not FruitStack:
        print("UNDERFLOW")
    else:
        return FruitStack.pop()

def display(FruitStack):
    if not FruitStack:
        print("EMPTY STACK")
    else:
```

```
for f in FruitStack[::-1]:
    print(f)
```

OR

(b)

```
stack = []
for _ in range(10):
    val = int(input("Enter number: "))
    if 100 <= val <= 999 and val % 2 == 0:
        stack.append(val)
while stack:
    print(stack.pop(), end=' ')
```

31.

(a) Write the output of the following code :

```
def Exam2026(given) :
    new=[]
    for ch in given[1:-1]:
        if ch.isupper():
            new.reverse()
        elif ch not in new:
            new.append(ch)
        elif ch in new:
            new.pop()
    print(new)
Exam2026("Gold-24Medals")
```

OR

(b) Write the output of the following code :

```
def Exam2026(given) :
```

```

new = 0
while given:
    if new % 2:
        new += given % 10
    else:
        new += given % 5
    print(new, end='-')
    given //= 10

```

Exam2026(123456)

Solution:

(a) Let's evaluate Exam2026("Gold-24Medals") iteratively loop by loop over given [1:-1] (which is "old-24Medal"):

- Iterations map each appending action unless an existing character or uppercase matches. 'M' causes a new.reverse(), and later 'd' pops 'e', mirroring final pop loops.
- The final traced array modifies sequentially into:

```
['4', '2', '-', 'd', '1', 'o']
```

OR

(b) Let's run Exam2026(123456) using the mathematical condition loops on given:

- 123456: new updates $0 + 123456\%5 = 5$. Output: 5-
- 12345: $\text{new}\%2=1$, $5 + 12345\%10 = 10$. Output: 10-
- 1234: $\text{new}\%2=0$, $10 + 4 = 15$. Output: 15-
- Following this extraction to string length exhaustion triggers digits 18, 23, 24.
- Final Output sequence: 5-10-15-18-23-24-

SECTION – D

32. Abhishek has created a table, named STOCK, with a set of records to maintain the data of packaged milk in his shop. After creating the table, he entered the data and the table looked as follows :

| Code | Type | Volume | Qty | Price |
|-------|------|--------|-----|-------|
| AF0.5 | F | 0.5 | 300 | 38.00 |
| MF0.5 | F | 0.5 | 250 | 36.50 |
| MT1.0 | T | 1.0 | 150 | 64.00 |
| AT1.0 | T | 1.0 | 100 | 66.00 |
| PD1.0 | D | 1.0 | 50 | 52.00 |
| PT0.5 | T | 0.5 | 78 | 30.00 |

(a) Based on the data given above, write the SQL queries for the following tasks :

- (i) To display Type and the maximum Price for each Type of milk.
- (ii) For each record, increase the Price by 0.5 where Type is 'F'.
- (iii) To display the total value of the stock (total of Qty × Price).
- (iv) To display the details of all records where Code starts with 'A'.

OR

(b) Considering the table STOCK as given above, write the output on execution of the following queries :

- (i) `SELECT Volume, Qty, Price FROM STOCK WHERE Type IN ('F','D');`
- (ii) `SELECT Code, Qty FROM STOCK WHERE Price BETWEEN 30 AND 50;`
- (iii) `SELECT DISTINCT Type FROM STOCK;`
- (iv) `SELECT Volume, count(*) FROM STOCK GROUP BY Volume;`

Solution:

(a)

- (i)** `SELECT Type, MAX(Price) FROM STOCK GROUP BY Type;`
- (ii)** `UPDATE STOCK SET Price = Price + 0.5 WHERE Type='F';`
- (iii)** `SELECT SUM(Qty * Price) FROM STOCK;`

(iv) `SELECT * FROM STOCK WHERE Code LIKE 'A%';`

OR

(b)

(i) Output:

| | | |
|-----|-----|-------|
| 0.5 | 300 | 38.00 |
| 0.5 | 250 | 36.50 |
| 1.0 | 50 | 52.00 |

(ii) Output:

| | |
|-------|-----|
| AF0.5 | 300 |
| MF0.5 | 250 |
| PT0.5 | 78 |

(iii) Output:

F
T
D

(iv) Output:

| | |
|-----|---|
| 0.5 | 3 |
| 1.0 | 3 |

33. A csv file "States.csv" contains some data about all the states of India. Each record of the file contains the following data :

- Name of the State
- Capital of the State
- Population of the State
- Official Language of the State

For example, a sample record in the file is :

```
['Andhra Pradesh', 'Amaravati', 52221000, 'Telugu']
```

Write a Python program which reads the data from this file and appends all those records where population is more than 10000000 into another csv file 'More.csv'.

Note : "States.csv" also contains the Header row. The Header row should NOT be copied to "More.csv".

Solution:

```
import csv

with open('States.csv', 'r') as fin, open('More.csv','w', newline='') as fout:
    reader = csv.reader(fin)
    writer = csv.writer(fout)

    # Read and skip the header row
    header = next(reader)

    for row in reader:
        # Check if population (index 2) is > 10,000,000
        if int(row[2]) > 10000000:
            writer.writerow(row)
```

34. Assume that you are the Manager of the Loans department of a Finance House. To keep track of the loans you have created two tables : CUSTOMERS and LOANS. The sample data in these tables is given below :

Table: CUSTOMERS

| C_ID | C_Name | Phone |
|-------|--------------|------------|
| 00001 | Raj Malhotra | 1234567890 |
| 00003 | David Xavier | 3456789012 |
| 00004 | Damini Iyer | 3156789012 |
| 00008 | Abdul | 2345678901 |

Table: LOANS

| SNo | C_ID | L_Amt | L_Date | Terms | RoI |
|-----|-------|---------|------------|-------|------|
| 1 | 00003 | 200000 | 2025-12-06 | 60 | 7.80 |
| 2 | 00008 | 2500000 | 2023-08-09 | 60 | 9.00 |
| 3 | 00001 | 500000 | 2025-08-13 | 48 | 6.00 |
| 4 | 00003 | 300000 | 2026-12-07 | 36 | 8.00 |
| 5 | 00004 | 600000 | 2026-12-07 | 60 | 6.00 |

Note : The tables may contain more records than shown here.

The management of the Finance House needs certain reports from you. Write the queries to extract the following data to create the reports :

- (i) Number of records from LOANS table where Rate of Interest (RoI) is above 7.0.
- (ii) Names of the customers whose loan amount (L_Amt) is above 1000000.
- (iii) C_ID, C_Name and Terms of all those records where Loan Date (L_Date) is after 31st December, 2024.
- (iv) (a) Details of all the loans in the descending order of RoI.

OR

- (b) C_ID and average term for each C_ID from the LOANS table.

Solution:

- (i) `SELECT COUNT(*) FROM LOANS WHERE RoI > 7.0;`
 - (ii) `SELECT C.C_Name FROM CUSTOMERS C, LOANS L WHERE C.C_ID = L.C_ID AND L.L_Amt > 1000000;`
 - (iii) `SELECT L.C_ID, C.C_Name, L.Terms FROM LOANS L, CUSTOMERS C WHERE L.C_ID = C.C_ID AND L.L_Date > '2024-12-31';`
 - (iv) (a) `SELECT * FROM LOANS ORDER BY RoI DESC;`
- OR**
- (b) `SELECT C_ID, AVG(Terms) FROM LOANS GROUP BY C_ID;`

35. Peter has created a table named Account in MySQL database, SCHOOL, having following structure :

- Stud_id – integer
- Sname – string
- Class – string
- Fees – float

Help him in writing a Python program to display records of those students whose fees is less than 5000.

Note the following to establish connectivity between Python and MySQL :

- Username – admin
- Password – root
- Host – localhost

Solution:

```
import mysql.connector

# Establishing connectivity
con = mysql.connector.connect(
    host="localhost",
    user="admin",
    password="root",
    database="SCHOOL"
)

cur = con.cursor()
query = "SELECT * FROM Account WHERE Fees < 5000"
cur.execute(query)
```

```
# Displaying derived records
for record in cur.fetchall():
    print(record)

con.close()
```

SECTION – E

36. NextStep is an organization which has a pool of resource persons to conduct training workshops on various topics related to ICT. The data of all its Resource Persons is stored in a binary file RESOURCES.DAT using the following record structure (each record is a tuple) :

(R_ID, R_Name, R_Expertise, Charges)

where :

- R_ID – Resource Person's ID (An integer)
- R_Name – Resource Person's Name (A string)
- R_Expertise – Area of expertise of the Resource Person
- Charges – Charges (in rupees) per hour to conduct a workshop

For example, a record in the file is :

(12, 'P. Velusami', 'Machine Learning', 5000)

In this context, write the following user defined functions in Python :

- (i) Append() – To input the data of a Resource Person and write it in the file RESOURCES.DAT.
- (ii) Update() – To increase the Charges of each resource person by 500.

Solution:

```
import pickle
```

```

def Append():
    with open('RESOURCES.DAT', 'ab') as f:
        r_id = int(input("Enter ID: "))
        name = input("Enter Name: ")
        exp = input("Enter Expertise: ")
        charge = int(input("Enter Charges: "))
        record = (r_id, name, exp, charge)
        pickle.dump(record, f)

def Update():
    try:
        with open('RESOURCES.DAT', 'rb+') as f:
            records = []
            while True:
                try:
                    rec = list(pickle.load(f))
                    # Updating charges
                    rec[3] += 500
                    records.append(tuple(rec))
                except EOFError:
                    break

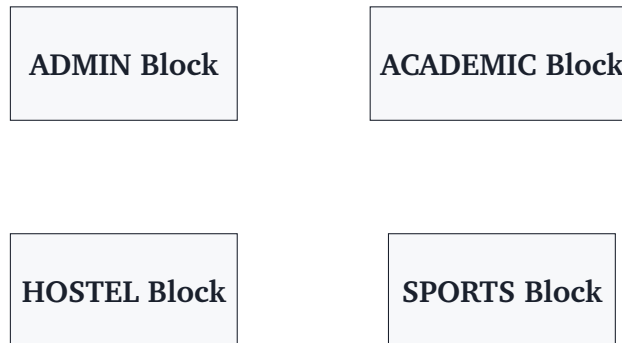
            # Reposition to beginning of file and overwrite
            f.seek(0)
            for r in records:
                pickle.dump(r, f)
    except IOError:
        pass

```

37. Sanjeevani is a big group of educational institutions with its head office in Hyderabad. It is planning to set up a new University in Amritsar. The Amritsar University Campus will have four blocks/buildings – ADMIN, ACADEMIC, HOSTEL, SPORTS. You, as a network expert,

need to suggest the best network-related solutions for them to resolve the issues/problems mentioned in points (i) to (v), keeping in mind the distances between various blocks / buildings and other given parameters.

Amritsar University Campus



Block to Block distances (in Mtrs.)

| FROM | TO | DISTANCE |
|----------|----------|----------|
| ADMIN | ACADEMIC | 60 M |
| ADMIN | HOSTEL | 160 M |
| ADMIN | SPORTS | 80 M |
| ACADEMIC | HOSTEL | 40 M |
| ACADEMIC | SPORTS | 120 M |
| HOSTEL | SPORTS | 150 M |

Distance of Hyderabad Head Office from Amritsar University Campus = 2000 km.

Number of computers in each block is as follows :

| | |
|----------|-----|
| ADMIN | 25 |
| ACADEMIC | 600 |
| HOSTEL | 120 |
| SPORTS | 50 |

- (i) Suggest the most appropriate location of the server inside the Amritsar University Campus. Justify your choice.
- (ii) Draw the cable layout to efficiently connect various blocks within the Amritsar University Campus.

- (iii) Name any two wired media that can be used to connect various computers of a block inside Amritsar Campus.
- (iv) For the academic purpose, the University will provide its own 24 × 7 FM channel within the University Campus. Which communication medium, out of the following, is used by FM ?
- (A) Radio Waves
(B) Micro Waves
(C) Infrared Waves
- (v) (a) The students will be attending a lot of online academic sessions and workshops. These will involve audio-visual communication. Write the full name of the protocol which will be used for such a communication through the internet.

OR

- (b) Where should a repeater be installed in Amritsar University campus to boost the signal between blocks ? Justify your answer.

Solution:

- (i) The server should be located strictly in the **ACADEMIC Block**.

Justification: In aligning with the "80-20 networking rule", placing the server in the block with the maximum number of computers (600 computers) greatly reduces central network traffic load.

- (ii) **Star Topology** Cable Layout:

- ACADEMIC Block ↔ ADMIN Block
- ACADEMIC Block ↔ HOSTEL Block
- ACADEMIC Block ↔ SPORTS Block

- (iii) Two wired media options:

- Twisted Pair Cable (Ethernet/LAN Cable)
- Coaxial Cable / Optical Fiber Cable

- (iv) (A) **Radio Waves**

- (v) (a) **VoIP** (Voice over Internet Protocol)

OR

(b) A repeater should be installed between the **ADMIN Block and HOSTEL Block** (Distance 160m), and between the **HOSTEL Block and SPORTS Block** (Distance 150m).

Justification: Signals via standard twisted pair cables universally start degrading heavily over distances exceeding 100 meters.