MARKING SCHEME OF 1st PREBOARD (KVS RO KOLKATA)
2024-25 (COMPUTER SCIENCE)

Time allowed: 3 Hours **Maximum Marks: 70**

General Instructions:

- This question paper contains 37 questions.
- All questions are compulsory. However, internal choices have been provided in some questions. Attempt only one of the choices in such questions
- The paper is divided into 5 Sections- A, B, C, D and E.
- Section A consists of 21 questions (1 to 21). Each question carries 1 Mark.
- Section B consists of 7 questions (22 to 28). Each question carries 2 Marks.
- Section C consists of 3 questions (29 to 31). Each question carries 3 Marks.
- Section D consists of 4 questions (32 to 35). Each question carries 4 Marks.
- Section E consists of 2 questions (36 to 37). Each question carries 5 Marks.
- All programming questions are to be answered using Python Language only.
- In case of MCQ, text of the correct answer should also be written **(No marks should be provided if student does not write the correct choice**)

Q No.	Section-A (21 x 1 = 21 Marks)	Marks
1.	State True or False: The Python statement print('Alpha'+1) is example of `TypeError Error` **Ans : True**	(1)
2.	What id the output of following code snippet? country = "GlobalNetwork" result = "-".join(country.split("o")).upper() print(result) (A) GL-BALNETW-RK (B) GL-BA-LNET-W-RK (C) GL-BA-LNET-W-RK (D) GL-BA-LNETWORK **Ans : A) GL-BALNETW-RK**	(1)
3.	Identify the output of the following code snippet: text = "The_quick_brown_fox" index = text.find("quick") result = text[:index].replace("_", "") + text[index:].upper() print(result) (A) Thequick_brown_fox (B) TheQUICK_BROWN_FOX (C) TheQUICKBROWNFOX (D) TheQUICKBROWN_FOX	(1)

	Ans : (B) TheQUICK_BROWN_FOX	

4.	What will be the output of the following Python expression?
	x = 5
	y = 10
	result = (x ** 2 + y) // x * y - x
	print(result)
	
	(A) 0
	(B) -5
	(C) 65
	(D) 265
	
	Ans : (C) 65
		(1)

5.	What will be the output of the following code snippet? text = "Python Programming" print(text[1 : :3]) (A) Ph oai (B) yoPgmn (C) yhnPormig (D) Pto rgamn **Ans : (B)**	(1)
6.	What will be the output of the following code? **tuple1 = (1, 2, 3)** **tuple2 = tuple1 + (4,)** **tuple1 += (5,)** **print(tuple1, tuple2)** (A) (1, 2, 3) (1, 2, 3, 4) (B) (1, 2, 3, 5) (1, 2, 3) (C) (1, 2, 3, 5) (1, 2, 3, 4) (D) Error **Ans : C)**	(1)
7.	Dictionary **my_dict** as defined below, identify type of error raised by statement my_dict['grape']? **my_dict = {'apple': 10, 'banana': 20, 'orange': 30}** ValueError (B) TypeError (C) KeyError (D) ValueError **Ans : (C) KeyError**	(1)

8.	What does the list.pop(x) method do in Python? A. Removes the first element from the list. B. Removes the element at index x from the list and returns it. C. Adds a new element at index x in the list. D. Replaces the element at index x with None. **Ans : B. Removes the element at index x from the list and returns it.**	(1)
9.	In a relational database table with one primary key and three unique constraints defined on different columns (not primary), how many candidate keys can be derived from this configuration? (A) 1 (B) 3 (C) 4 (D) 2 **Ans : C) 4**	(1)

10.	Fill in the blanks to complete the following code snippet choosing the correct option:
	
	with open("sample.txt", "w+") as file:
	file.write("Hello, World!") # Write a string to the file
	position_after_write = file._____ # Get the position after writing
	file.seek(0) # Move the pointer to the beginning
	content = file.read(5) # Read the first 5 characters
	print(content)
	
	(A) tell
	(B) seek
	(C) read
	(D) write
	
	Ans : (A) tell
		(1)

11.	State whether the following statement is True or False: In Python, if an exception is raised inside a try block and not handled, the program will terminate without executing any remaining code in the finally block. **Ans : False**	(1)

12.	What will be the output of the following code?
	x = 4
	def reset():
	global x
	x = 2
	print(x, end='&')
	def update():
	x += 3
	print(x, end='@')
	
	update()
	x = 6
	reset()
	print(x, end='$')
	
	(A) 7@2&6$
	(B) 7@6&6$
	(C) 7@2&2$
	(D) Error
	Ans : (D) Error : Unbound local variable x in function update()
		(1)

13.	Which SQL command can modify the structure of an existing table, such as adding or removing columns? (A) ALTER TABLE (B) UPDATE TABLE (C) MODIFY TABLE (D) CHANGE TABLE **Ans. (A) ALTER TABLE**	(1)
14.	What will be the output of the query? `SELECT * FROM orders WHERE order_date LIKE '2024-10-%';` (A) Details of all orders placed in October 2024 (B) Details of all orders placed on October 10th, 2024 (C) Details of all orders placed in the year 2024 (D) Details of all orders placed on any day in 2024 **Ans : (A) Details of all orders placed in October 2024**	(1)
15.	Which of the following statements about the CHAR and VARCHAR datatypes in SQL is false? (A) CHAR is a fixed-length datatype, and it pads extra spaces to match the specified length. (B) VARCHAR is a variable-length datatype and does not pad extra spaces. (C) The maximum length of a VARCHAR column is always less than that of a CHAR column. (D) CHAR is generally used for storing data of a known, fixed length. **Ans : (C)**	(1)

16.	Which of the following aggregate functions can be employed to determine the number of unique entries in a specific column, effectively ignoring duplicates? (A) SUM() (B) COUNT() (C) AVG() (D) COUNT(DISTINCT column_name) **Ans : (D) COUNT(DISTINCT column_name)**	(1)
17.	Which protocol is used to send e-mail over internet? (A) FTP (B) TCP (C) SMTP (D) SNMP **Ans. (C) SMTP**	(1)
18.	Which device is primarily used to amplify and regenerate signals in a network, allowing data to travel longer distances? (A) Switch (B) Router (C) Repeater (D) Bridge **Ans : (C) Repeater**	(1)
19.	Which communication technique establishes a dedicated communication path between two devices for the entire duration of a transmission, ensuring a continuous and consistent connection? **Ans : Circuit Switching**	(1)
	Q20 and Q21 are Assertion(A) and Reason(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 the correct explanation for A** **(C) A is True but R is False** **(D) A is False but R is True**	
20.	Assertion (A): Python functions can accept positional, keyword, and default parameters. Reasoning (R): Default parameters allow function arguments to be assigned a default value if no argument is provided during the function call. **Ans : (B) Both A and R are true and R is not the correct explanantion for A**	(1)
21.	Assertion (A): A GROUP BY clause in SQL can be used without any aggregate functions. Reasoning (R): The GROUP BY clause is used to group rows that have the same values in specified columns and must always be paired with aggregate functions.	(1)

	Ans : (C) A is True , but R is False	
Q No	**Section-B (7 x 2=14 Marks)**	**Marks**
22.	Consider the following Python code snippet: a = [1, 2, 3] b = a a.append(4) c = (5, 6, 7) d = c + (8,) a. Explain the mutability of a and c in the context of this code. b. What will be the values of b and d after the code is executed? **Ans : a) a is a mutable object (a list), meaning its contents can be changed after it is created. This is demonstrated by the append() method that adds an element to the list.** **c is an immutable object (a tuple). Once created, its contents cannot be changed. The operation c + (8,) does not modify c but creates a new tuple.** **b)The value of b will be [1, 2, 3, 4], as b references the same list as a, which was modified by appending 4.** **The value of d will be (5, 6, 7, 8), as the expression c + (8,) creates a new tuple combining c and (8,).** ***(1 marks + 1 Marks)***	(2)
23.	Give examples for each of the following types of operators in Python: (I) Assignment Operators (II) Identity Operators **Ans :** **(I) Assignment Operators: (1 Marks for Any one of them)** 1. **Example 1: = (Simple Assignment) Usage: `x = 5` (assigns the value `5` to `x`)** 2. **Example 2: += (Add and Assign) : Usage: `x += 3` (equivalent to `x = x + 3`)** **(II) Identity Operators: (1 Marks for any one of them)** 1. **Example 1: `is` , Usage: `x is y` (checks if `x` and `y` refer to the same object)** 2. **Example 2: `is not` : Usage: `x is not y` (checks if `x` and `y` do not refer to the same object)**	(2)

24.	If L1 = [10, 20, 30, 40, 20, 10, ...] and L2 = [5, 15, 25, ...], then: *(Answer using builtin functions only)* (I) A) Write a statement to count the occurrences of 20 in L1. OR B) Write a statement to find the minimum value in L1. (II) A) Write a statement to extend L1 with all elements from L2. OR B) Write a statement to get a new list that contains the unique elements from L1. **Ans : I (A) : count_20 = L1.count(20)** **(B) : min_value = min(L1)** **II (A) : L1.extend(L2)** **(B) : unique_elements = list(set(L1))** ***(1 marks for each correct answer , no marks if did not used any built in function)***	(2)

25.	Identify the correct output(s) of the following code. Also write the minimum and the maximum possible values of the variable b.
	`import random`
	`text = "Adventure"`
	`b = random.randint(1, 5)`
	`for i in range(0, b):`
	`print(text[i], end='*')`
	
	(A) A* | (B) A*D*
	(C) A*d*v* | (D) A*d*v*e*n*t*u*
	
	Ans : • Minimum possible value of b: 1 ***(1/2 + 1/2 marks)***
	• **Maximum possible value of b: 5**
	
	Possible Outputs : (A) and (C) ***(1/2 + 1/2 marks)***
		(2)

26.	The code provided below is intended to reverse the order of elements in a given list. However, there are syntax and logical errors in the code. Rewrite it after removing all errors. Underline all the corrections made. def reverse_list(lst) if not lst: return lst reversed_lst = lst[::-1] return reversed_lst print("Reversed list: " reverse_list[1,2,3,4]) **Ans : Corrections : (1/2 x 4 = 2)** **iAdded a colon (:) after the function definition.** **ii. Indented the if statement and the return statement for proper structure.** **iii. Put ( ) while calling the function reverse_list( )** **iv. Added a comma (,) in the print statement for correct syntax.**	(2)
27.	(I) A) What constraint should be applied to a table column to ensure that all values in that column must be unique and not NULL? OR B) What constraint should be applied to a table column to ensure that it can have multiple NULL values but cannot have any duplicate non-NULL values?	(2)
	(II) A) Write an SQL command to drop the unique constraint named unique_email from a column named email in a table called Users. OR B) Write an SQL command to add a unique constraint to the email column of an existing table named Users, ensuring that all email addresses are unique. **Ans : (I)(A): Use the UNIQUE constraint along with the NOT NULL OR PRIMARY KEY constraint.** **OR** **(B): Use the UNIQUE constraint alone, allowing for multiple NULL values.** **Example: column_name INT UNIQUE NULL** **(II)(A):ALTER TABLE Users DROP CONSTRAINT unique_email;** **OR** **(B):ALTER TABLE Users ADD CONSTRAINT unique_email UNIQUE (email);** ***(1 mark each for correct part for each questions any correct example as an answer is acceptable)***	

28.	A) Explain one advantage and one disadvantage of mesh topology in computer networks. OR B) Expand the term DNS. What role does DNS play in the functioning of the Internet? **Ans :** **(A): Advantage of Mesh Topology: High redundancy; if one connection fails, data can still be transmitted through other nodes.** **Disadvantage of Mesh Topology: Complexity and high cost; requires more cabling and configuration compared to simpler topologies.** **OR** **(B): · DNS stands for Domain Name System. It translates human-readable domain names (like www.example.com) into IP addresses that computers use to identify each other on the network.** ***(for part A 1/2 + 1/2)*** ***(for part B 1/2 for correct abbreviation and 1/2 for correct use)***	(2)

Q No.	Section-C (3 x 3 = 9 Marks)	Marks
29.	A) Write a Python function that extracts and displays all the words present in a text file “Vocab.txt” that begins with a vowel.. OR B) Write a Python function that extracts and displays all the words containing a hyphen ("-") from a text file "HyphenatedWords.txt", which has a three letter word before hypen and four letter word after hypen. For example : “for-them” is such a word. Ans : A) **def display_words_starting_with_vowel():** **vowels = 'AEIOUaeiou'** **with open('Vocab.txt', 'r') as file:** **words = file.read().split()** **# Loop through the words and check if the first letter is a vowel** **for word in words:** **if word[0] in vowels:** **print(word)** B) **def display_specific_hyphenated_words():** **with open('HyphenatedWords.txt', 'r') as file:** **words = file.read().split()** **# Loop through the words and check if they match the pattern** **for word in words:** **parts = word.split('-')** **# Check if the word is hyphenated and matches the format "XXX-XXXX"** **if len(parts) == 2 and len(parts[0]) == 3 and len(parts[1]) == 4:** **print(word)**	(3)

	1/2 mark for file opening + 1/2 mark for correct loop +1/2 mark for correct use of split( ) + 1 mark for correct condition + 1/2 mark for output	
30.	(A) You have a stack named MovieStack that contains records of movies. Each movie record is represented as a list containing movie_title, director_name, and release_year. Write the following user-defined functions in Python to perform the specified operations on the stack MovieStack: (I) push_movie(MovieStack, new_movie): This function takes the stack MovieStack and a new movie record new_movie as arguments and pushes the new movie record onto the stack. (II) pop_movie(MovieStack): This function pops the topmost movie record from the stack and returns it. If the stack is empty, the function should display "Stack is empty". (III) peek_movie(MovieStack): This function displays the topmost movie record from the stack without deleting it. If the stack is empty, the function should display "None". **OR** (B) Write the definition of a user-defined function push_odd(M) which accepts a list of integers in a parameter M and pushes all those integers which are odd from the list M into a Stack named OddNumbers. Write the function pop_odd() to pop the topmost number from the stack and return it. If the stack is empty, the function should display "Stack is empty". Write the function disp_odd() to display all elements of the stack without deleting them. If the stack is empty, the function should display "None". For example: If the integers input into the list NUMBERS are: [7, 12, 9, 4, 15] Then the stack OddNumbers should store: [7, 9, 15] **Ans : (A)** **def push_movie(movie_stack, new_movie): # 1 mark** **movie_stack.append(new_movie)** **def pop_movie(movie_stack):** **if not movie_stack: # 1 mark** **return "Stack is empty"**	(3)

```
    return movie_stack.pop()
def peek_movie(movie_stack):
    if not movie_stack:                    # 1 mark
        return "None"
    return movie_stack[-1]
```

OR

```
(B) def push_odd(M, odd_numbers):
        for number in M:                   # 1mark
            if number % 2 != 0:
                odd_numbers.append(number)
def pop_odd(odd_numbers):
    if not odd_numbers:                    # 1mark
        return "Stack is empty"
    return odd_numbers.pop()


def disp_odd(odd_numbers):
    if not odd_numbers:                    # 1mark
        return "None"
    return odd_numbers
```

31. Predict the output of the following code:

```
data = [3, 5, 7, 2]
result = ""
for num in data:
  for i in range(num):
    result += str(i) + "*"
result = result[:-1]
print(result)
```

OR

Predict the output of the following code: (3)

```
numbers = [10, 15, 20]
for num in numbers:
    for j in range(num // 5):
        print(j, "+", end="")
    print()
```

Ans : 0*1*2*0*1*2*3*4*0*1*2*3*4*5*6*0*1
(1 mark for predicting correct output sequence of numbers + 1 mark for predicting correct placement of * + 1 mark for removing last *)

OR

```
0 +1 +
0 +1 +2 +
0 +1 +2 +3 +
```

(1 MARK For putting output in three lines + 1 mark for predicting correct sequence of numbers in each line (1/2 for incorrect partially correct) + 1 mark for correct placement of +)

Q No.	Section-D (4 x 4 = 16 Marks)	Marks

32. Consider the table ORDERS as given below

O_Id	C_Name	Product	Quantity	Price
1001	Jitendra	Laptop	1	12000
1002	Mustafa	Smartphone	2	10000
1003	Dhwani	Headphone	1	1500
1004	Alice	Smartphone	1	9000
1005	David	Tablet	NULL	7000

Note: The table contains many more records than shown here. (4)

A) Write the following queries:

(I) To display the total Quantity for each Product, excluding Products with total Quantity less than 5.

(II) To display the ORDERS table sorted by total price in descending order.

(III) To display the distinct customer names from the ORDERS table.

(IV) To display the sum of the Price of all the orders for which the quantity is NULL.

OR

B) Write the output:

(I) SELECT C_Name, SUM(Quantity) AS Total_Quantity FROM ORDERS GROUP BY C_Name;

(II) SELECT * FROM ORDERS WHERE Product LIKE '%phone%';

(III) SELECT O_Id, C_Name, Product, Quantity, Price FROM ORDERS WHERE Price BETWEEN 1500 AND 12000;

(IV) SELECT MAX(Price) FROM ORDERS;

Ans : (A) (1 MARK EACH)

(I) SELECT Product, SUM(Quantity) AS Total_Quantity
FROM ORDERS
GROUP BY Product
HAVING SUM(Quantity) >= 5;

(II)SELECT O_Id, C_Name, Product, Quantity, Price
FROM ORDERS
ORDER BY Price DESC;

(III)SELECT DISTINCT C_Name
FROM ORDERS;

(IV)SELECT SUM(Price) AS Total_Price_Null_Quantity
FROM ORDERS
WHERE Quantity IS NULL;

OR

(B) (1 MARK EACH)

(I)

C_Name	Total_Quantity
Jitendra	1
Mustafa	2
Dhwani	1
Alice	1
David	NULL

(II)

O_Id	C_Name	Product	Quantity	Price
1002	Mustafa	Smartphone	2	10000
1004	Alice	Smartphone	1	9000

(III)

O_Id	C_Name	Product	Quantity	Price
1001	Jitendra	Laptop	1	12000
1002	Mustafa	Smartphone	2	10000
1003	Dhwani	Headphone	1	1500
1004	Alice	Smartphone	1	9000

(IV)

MAX(Price)

12000

33. A CSV file "HealthData.csv" contains the data of a health survey. Each record of the file contains the following data: (4)

- Name of a country
- Life Expectancy (average number of years a person is expected to live)
- GDP per capita (Gross Domestic Product per person)
- Percentage of population with access to healthcare

For example, a sample record of the file may be: ['Wonderland', 82.5, 40000, 95].

Write the following Python functions to perform the specified operations on this file:

(I) Read all the data from the file in the form of a list and display all those records for which the life expectancy is greater than 75.

(II) Count the number of records in the file.

Ans : (I)

```
import csv
def read_health_data(filename):
 records = []
 with open(filename, mode='r') as file:
      reader = csv.reader(file)
      next(reader)  # Skip the header row if present
      for row in reader:
         country = row[0]
         life_expectancy = float(row[1])
         gdp_per_capita = float(row[2])
         access_to_healthcare = float(row[3])
         if life_expectancy > 75 :
            records.append([country, life_expectancy, gdp_per_capita,
                                    access_to_healthcare])
   return records
```

(II)

```
def count_records( ):
    records = read_health_data("HealthData.csv")
    return len(records)
```

34. Alex has been tasked with managing the Student Database for a High School. He needs to access some information from the STUDENTS and SUBJECTS tables for a performance evaluation. Help him extract the following information by writing the desired SQL queries as mentioned below. (4)

Table: STUDENTS

S_ID	FName	LName	Enrollment_Date	Marks
201	John	Doe	15-09-2020	85
202	Jane	Smith	10-05-2019	90
203	Alex	Johnson	22-11-2021	75
204	Emily	Davis	30-01-2022	60
205	Michael	Brown	17-08-2018	95

Table: SUBJECTS

Sub_ID	S_ID	SubName	Credits
301	201	Mathematics	3
302	202	Science	4
303	203	History	2
304	204	Literature	3
305	205	Physics	4
306	201	Computer Science	3

Write the following SQL queries:

(I) To display complete details (from both the tables) of those students whose marks are greater than 70.

(II) To display the details of subjects whose credits are in the range of 2 to 4 (both values included).

(III) To increase the credits of all subjects by 1 which have "Science" in their subject names.

(IV) (A) To display names (FName and LName) of students enrolled in the "Mathematics" subject.

(OR)

(B) To display the Cartesian Product of these two tables.

Ans : (I)

```
SELECT * FROM STUDENTS S
JOIN SUBJECTS Sub ON S.S_ID = Sub.S_ID
WHERE S.Marks > 70;
```

	(II) SELECT * FROM SUBJECTS WHERE Credits BETWEEN 2 AND 4; (III) UPDATE SUBJECTS SET Credits = Credits + 1 WHERE SubName LIKE '%Science%'; (IV) A: SELECT FName, LName FROM STUDENTS S JOIN SUBJECTS Sub ON S.S_ID = Sub.S_ID WHERE Sub.SubName = 'Mathematics'; OR B: SELECT * FROM STUDENTS, SUBJECTS;	
35.	A table, named ELECTRONICS, in the PRODUCTDB database, has the following structure: Field Type productID int(11) productName varchar(20) price float stockQty int(11) **Write the following Python function to perform the specified operation:** AddAndDisplay(): To input details of a product and store it in the table ELECTRONICS. The function should then retrieve and display all records from the ELECTRONICS table where the price is greater than 150. Assume the following for Python-Database connectivity: Host: localhost User: root Password: Electro123 **Ans :** **import mysql.connector** **def AddAndDisplay():** **# Connect to the database** **conn = mysql.connector.connect(** **host='localhost',** **user='root',** **password='Electro123',** **database='PRODUCTDB'** **)** **cursor = conn.cursor()** **productID = int(input("Enter Product ID: "))**	(4)

	productName = input("Enter Product Name: ") **price = float(input("Enter Price: "))** **stockQty = int(input("Enter Stock Quantity: "))** **cursor.execute("INSERT INTO ELECTRONICS** **(productID, productName,** **price, stockQty) VALUES (%s,** **%s, %s, %s)", (productID,** **productName, price, stockQty))** **conn.commit()** **cursor.execute("SELECT * FROM ELECTRONICS** **WHERE price > 150")** **records = cursor.fetchall()** **print("\nRecords with price greater than 150:")** **for record in records:** **print(record)** **cursor.close()** **conn.close()|** ***(1 Mark for Declaration of correct Connection Object + 1 Mark for correct input + 1 marks for correctly using execute( ) method + 1 marks for showing output using loop)***	
Q.No.	**SECTION E (2 X 5 = 10 Marks)**	**Marks**
36.	Raj is a supervisor at a software development company. He needs to manage the records of various employees. For this, he wants the following information of each employee to be stored: Employee_ID – integer Employee_Name – string Position – string Salary – float You, as a programmer of the company, have been assigned to do this job for Raj. (I) Write a function to input the data of an employee and append it to a binary file. (II) Write a function to update the data of employees whose salary is greater than 50000 and change their position to "Team Lead". (III) Write a function to read the data from the binary file and display the data of all those employees who are not "Team Lead". Ans : (I) **import pickle** **def add_employee(filename):** **employee_id = int(input("Enter Employee ID: "))** **employee_name = input("Enter Employee Name: ")** **position = input("Enter Position: ")** **salary = float(input("Enter Salary: "))** **new_employee = (employee_id, employee_name, position, salary)** **with open(filename, 'ab') as file:** **pickle.dump(new_employee, file)** ***(1/2 mark for input + 1 mark for correct use of dump( ) to add new emp***	(5)

data)

(II)

```
def update_employee(filename):
    employees = []
    with open(filename, 'rb') as file:
        try:
            while True:
                employees.append(pickle.load(file))
        except EOFError:
            pass
    for i in range(len(employees)):
        if employees[i][3] > 50000:
            employees[i] = (employees[i][0], employees[i][1], "Team Lead",
                            employees[i][3])
    with open(filename, 'wb') as file:
        for employee in employees:
            pickle.dump(employee, file)
```

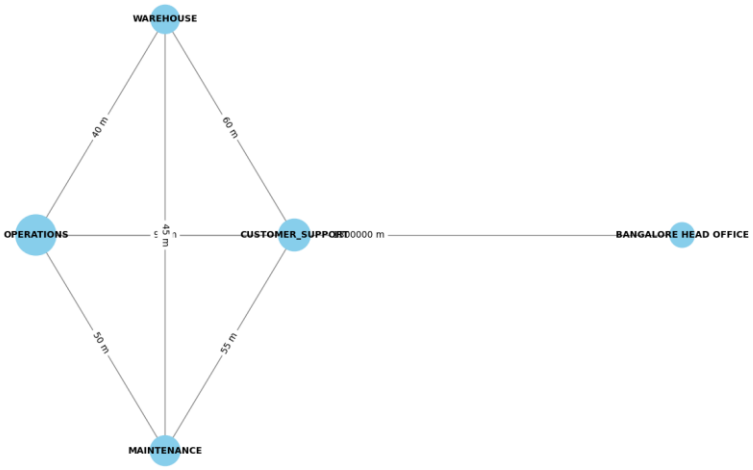
(1 mark for correct use of load( ) method to retrieve data + 1/2 mark for correct loop + 1/2 mark for correct condition within loop)

(III)

```
def display_non_team_leads(filename):
    print("\nEmployees who are not Team Leads:")
    with open(filename, 'rb') as file:
        try:
            while True:
                employee = pickle.load(file)
                if employee[2] != "Team Lead":
                    print(f"ID: {employee[0]}, Name: {employee[1]}, Position:
                          {employee[2]}, Salary: {employee[3]}")
        except EOFError:
            pass
```

(1 mark for correct use of Try except block and 1/2 mark for correct use of while loop)

37.	Interstellar Logistics Ltd. is an international shipping company. They are planning to establish a new logistics hub in Chennai, with the head office in Bangalore. The Chennai hub will have four buildings - OPERATIONS, WAREHOUSE, CUSTOMER_SUPPORT, and MAINTENANCE. As a network specialist, your task is to propose the best networking solutions to address the challenges mentioned in points (I) to (V), considering the distances between the various buildings and the given requirements.	(5)



Building-to-Building Distances (in meters):

From	To	Distance
OPERATIONS	WAREHOUSE	40 m
OPERATIONS	CUSTOMER_SUPPORT	90 m
OPERATIONS	MAINTENANCE	50 m
WAREHOUSE	CUSTOMER_SUPPORT	60 m
WAREHOUSE	MAINTENANCE	45 m
CUSTOMER_SUPPORT	MAINTENANCE	55 m

Distance of Bangalore Head Office from Chennai Hub: 1300 km

Number of Computers in Each Building/Office:

Location	Computers
OPERATIONS	40
WAREHOUSE	20
CUSTOMER_SUPPORT	25
MAINTENANCE	22
BANGALORE HEAD OFFICE	15

(I) Suggest the most suitable location for the server within the Chennai hub. Justify your decision.

(II) Recommend the hardware device to connect all computers within each building efficiently.

(III) Draw a cable layout to interconnect the buildings at the Chennai hub efficiently. Which type of cable would you recommend for the fastest and most reliable data transfer?

(IV) Is there a need for a repeater in the proposed cable layout? Justify your answer.

(V) A) Recommend the best option for live video communication between the Operations Office in the Chennai hub and the Bangalore Head Office from the following choices:

- a) Video Conferencing
- b) Email
- c) Telephony
- d) Instant Messaging

OR

(V) B) What type of network (PAN, LAN, MAN, or WAN) would be set up among the computers within the Chennai hub?

Ans :

(I) The server should be placed in the OPERATIONS building.
Justification:

- **It has the largest number of computers (40), making it the most central location in terms of the network load.**
- **The distances to other buildings are relatively short, ensuring efficient data transfer.** ***(1 Mark)***

(II) A switch should be used within each building to connect all computers. A switch is ideal for creating a local area network (LAN) and ensures efficient communication between devices in a single building. ***(1 Mark)***

(III) The most efficient cable layout would involve connecting the buildings as follows:

- **OPERATIONS to WAREHOUSE (40 m)**
- **OPERATIONS to MAINTENANCE (50 m)**
- **OPERATIONS to CUSTOMER_SUPPORT (90 m)**
- **WAREHOUSE to MAINTENANCE (45 m)**
- **WAREHOUSE to CUSTOMER_SUPPORT (60 m)**

CUSTOMER_SUPPORT

|

(90 m)

|

OPERATIONS

**/ | **

(40 m) (50 m) (60 m)

**/ | **

WAREHOUSE MAINTENANCE

Cable Recommendation: Fiber optic cable is recommended for high-speed data transfer and reliable communication over distances. It offers better bandwidth and lower signal degradation over long distances than copper cables. ***(1/2 + 1/2 mark)***

(III) There is no need for a repeater in this layout. The maximum distance between any two buildings is 90 meters, which is well within the 100-meter limit for Ethernet cable or fiber optics before requiring a repeater.

(1 mark)

(IV) A) The best option for live communication between the Chennai Operations Office and the Bangalore Head Office would be Video Conferencing. This allows real-time face-to-face meetings and visual communication across long distances, which is ideal for inter-office collaboration.

OR

(V) B) **The network type in the Chennai hub would be a LAN (Local Area Network), as all computers are located within a confined geographical area (the logistics hub) and are connected to each other for data communication within the same campus.**

(1 mark for any correct part solution)