

PRACTICE PAPER – 2

Time Allowed: 3 hrs

Maximum Marks: 70

General Instructions:

- Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- Section E consists of 3 questions (35 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.

Section A (21 × 1 = 21 Marks)

1. State whether the following statement is True or False: [1]
The values attribute returns the DataFrame data as a NumPy array.
2. What will be the output of the following SQL command? [1]

```
SELECT ROUND(45.678, 1);
```

(a) 45 (b) 45.6
(c) 45.7 (d) 46
3. Meenakshi notices that someone has edited her photos and posted them online with offensive comments, causing her mental distress. This activity is an example of which type of cybercrime? [1]
(a) Cyberbullying (b) Identity Theft
(c) Hacking (d) Phishing
4. Which argument of `read_csv()` is used to treat the first row as data instead of column names? [1]
(a) `index_col` (b) `header=None`
(c) `names=True` (d) `skiprows=1`
5. Which device is used to regenerate and amplify weak signals in a network? [1]
(a) Hub (b) Router
(c) Repeater (d) Modem
6. What does the `MONTHNAME(date)` function return? [1]
(a) Month number (b) Year
(c) Day name (d) Month name
7. Raghav has invented a new water-saving device and wants exclusive rights to manufacture and sell it. Which IPR should he apply for? [1]
(a) Copyright (b) Trademark
(c) Patent (d) Industrial Design
8. The function used to create a Pandas Series is _____. [1]
(a) `pd.series()` (b) `pd.createSeries()`
(c) `pd.Series()` (d) `pandas.makeSeries()`

9. If a table has 5 candidate keys, how many of them can be selected as a primary key? [1]
 (a) 1 (b) 2 (c) 4 (d) 5
10. Which of the following is an application of the FTP protocol? [1]
 (a) Video Conferencing (b) Chatting
 (c) File Uploading and Downloading (d) Online Shopping
11. Which SQL function returns the total number of rows in a table, including rows with NULL values? [1]
 (a) COUNT(column_name) (b) SUM(column_name)
 (c) COUNT(*) (d) AVG(column_name)
12. Selecting a single column from a Pandas DataFrame returns a _____. [1]
 (a) DataFrame (b) Series
 (c) List (d) Tuple
13. The legal framework for electronic governance in India is provided by _____. [1]
 (a) Right to Information Act (b) Digital India Act
 (c) Information Technology Act, 2000 (d) E-Commerce Act
14. Which SQL clause is used to filter rows based on a condition? [1]
 (a) WHERE (b) ORDER BY
 (c) GROUP BY (d) HAVING
15. Which of the following Python commands is used to select row number 4 only of a dataframe df, assuming that labelled indices are consecutive integers starting from 0? [1]
 (a) df.loc[4] (b) df.iloc[4]
 (c) df.iloc[4:5] (d) Both (b) and (c)
16. Which network topology is easy to install and cost-effective for small networks? [1]
 (a) Mesh (b) Star (c) Bus (d) Tree
17. What is the use of the SUBSTR() function in SQL? [1]
 (a) To replace characters in a string (b) To extract a portion of a string
 (c) To find the position of a substring (d) To concatenate two strings
18. Which of the following creates a DataFrame with column names only and no data? [1]
 (Note: pd is an alias for pandas.)
 (a) pd.DataFrame(columns=['A', 'B']) (b) pd.DataFrame(['A', 'B'])
 (c) pd.DataFrame({'A', 'B'}) (d) pd.DataFrame(A, B)
19. Which clause is commonly used with aggregate functions to group data? [1]
 (a) FROM (b) HAVING
 (c) GROUP BY (d) DISTINCT

Questions 20 and 21 are Assertion(A) and Reason(R) type questions. Choose the correct options as:

- (a) Both (A) and Reason (R) are True and (R) is the correct explanation for (A).
 (b) Both (A) and (R) are True but (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):** The output of `print(df.head())` and `print(df.loc[:4])` will be the same for a DataFrame df having default integer index starting from 0. [1]
Reason (R): `df.head()` displays the first five rows and `df.loc[:4]` selects rows with index labels from 0 to 4.
21. **Assertion (A):** The UPDATE command can modify values of existing records in a table. [1]
Reason (R): The UPDATE command is used to change data stored in a table.

Section B (7 × 2 = 14 Marks)

22. (a) What is csv file in Python? Mention any two advantages of csv file. [2]

OR

(b) List any two differences between lists and series.

23. What is identity theft? Explain with the help of an example. [2]

24. Ankit wants to create a Pandas series to store marks obtained by students as shown below: [2]

```
Anita 85
Rohan 78
Meena 92
```

Help him complete the code below to achieve the desired output.

Note: marks_data is a dictionary.

```
import _____ as pd
marks_data = _____
m = pd._____ (marks_data)
print(m)
```

25. (a) Mohit has created an e-commerce website for his school project but does not understand how users from different locations can view it. Explain the function of a web server and how it helps in delivering web pages to users. [2]

OR

(b) Give one advantage of star topology. Also, state how four computers can be connected to each other using star topology in a network.

26. Write SQL queries to perform the following: [2]

I. Display the name of the day (e.g., Monday, Tuesday) for the date '2026-01-20'.

II. Find and display the position of the substring "Web" in the string "Web Development Basics".

27. What do you understand by netiquette? Explain any two. [2]

28. (a) Write the output of the following code: [2]

```
import pandas as pd
subjects = pd.Series(['Maths', 'Physics', 'Chemistry'])
codes = pd.Series([101, 102, 103])
df = pd.DataFrame({'Subject': subjects, 'Code': codes})
df.rename(columns={'Code': 'SubCode'}, inplace=True)
print(df)
```

OR

(b) Write the output of the following code:

```
import pandas as pd
courses = pd.Series(['Python', 'Java', 'SQL'])
duration = pd.Series([3, 4, 2])
df = pd.DataFrame({'Course': courses, 'Months': duration})
df.drop(index=1, inplace=True)
print(df)
```

Section C (4 × 3 = 12 Marks)

29. Sanchit has created a new software tool for online examinations and wants to protect his work from unauthorized copying. [3]

I. Define Intellectual Property and Intellectual Property Rights.

II. Under which IPR category does Sanchit's software fall?

III. State the importance of IPR in the IT industry.

30. (a) Write a Python program to create a Pandas Series using an ndarray, where the state names are the indices and the literacy rate (%) are the values in the series. [3]

| | |
|-------------|----|
| Kerala | 96 |
| Maharashtra | 82 |
| Gujarat | 79 |

OR

- (b) Write a Python program to create the Pandas DataFrame displayed below using a list of dictionaries.

| | Country | Capital |
|---|---------|-----------|
| 0 | India | New Delhi |
| 1 | France | Paris |
| 2 | Japan | Tokyo |

31. I. Write an SQL statement to create a table named **HOSPITAL**, with the following specifications: [2+1]

| Column Name | Data Type | Key |
|--------------|-------------|-------------|
| Patient_ID | Numeric | Primary Key |
| Patient_Name | Varchar(35) | |
| AdmitDate | Date | |
| BillAmount | Float(8,2) | |

- II. Write an SQL query to insert the following data into the **HOSPITAL** table:

1201, 'Kavita Singh', '2024-12-01', 45600.00

32. (a) Consider the following two tables: [3]

Table 1: SCHOOL, which stores **AdmNo**, **StudentName** and **Class**.

| AdmNo | StudentName | Class |
|-------|-------------|-------|
| 101 | Riya | 12 |
| 102 | Aman | 11 |
| 103 | Neha | 12 |
| 104 | Karan | 12 |
| 105 | Mehul | 11 |

Table 2: RESULT, which stores **AdmNo**, **Subject** and **Marks**.

| AdmNo | Subject | Marks |
|-------|-----------|-------|
| 101 | Maths | 85 |
| 102 | Physics | 78 |
| 103 | Maths | 90 |
| 104 | Chemistry | 88 |
| 105 | Maths | 72 |

Write appropriate SQL queries for the following:

- I. List the names of students studying in Class 12, sorted in ascending order.
- II. Display the subject names in uppercase where students have scored less than 75 marks.
- III. Display the names of students along with subject and marks.

OR

(B) Consider the following table **ANIMAL**, which stores **AnimalID**, **AnimalName**, **Category** and **Age**.

Table: ANIMAL

| AnimalID | AnimalName | Category | Age |
|----------|------------|----------|-----|
| 601 | Tiger | Wild | 5 |
| 602 | Cow | Domestic | 4 |
| 603 | Dog | Domestic | 3 |
| 604 | Lion | Wild | 6 |
| 605 | Cat | Domestic | 7 |

- I. Which attribute in the table can be considered as the Primary Key? Provide justification for your answer.
- II. Write a suitable SQL query to add a new column, `HealthStatus`, of `VARCHAR` data type to the table.
- III. Write the output of the following SQL query:

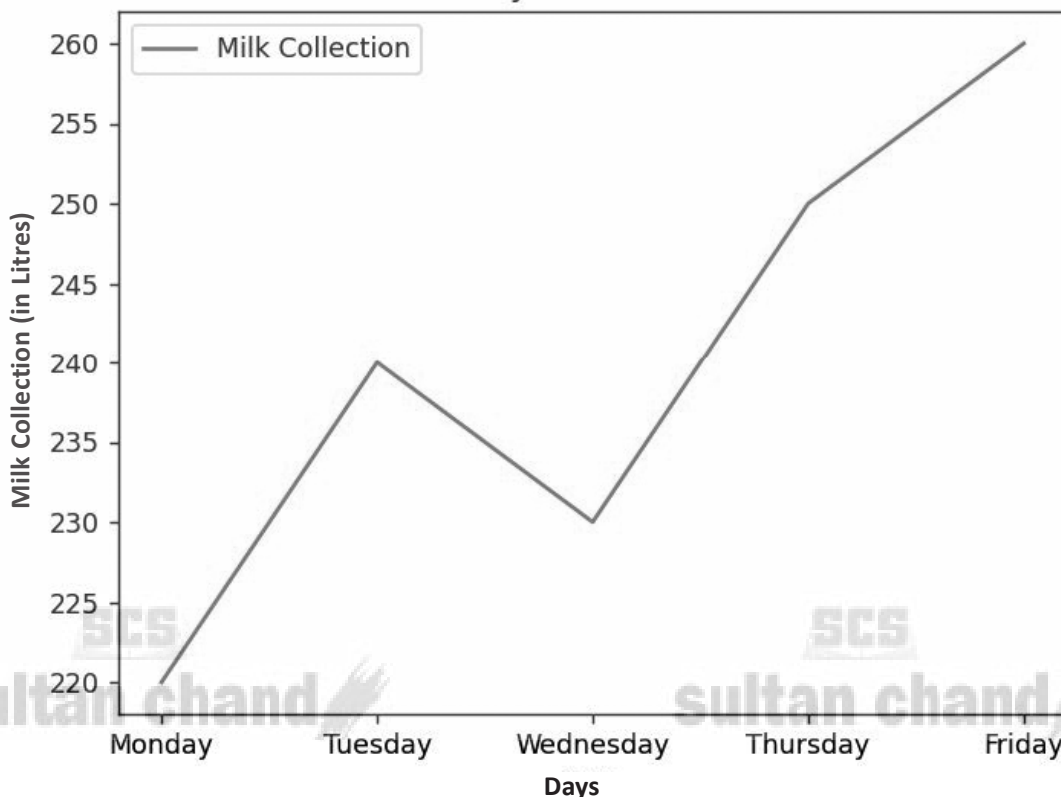
```
SELECT Category, COUNT(*) FROM ANIMAL GROUP BY Category;
```

Section D (2 × 4 = 8 Marks)

33. Shrey, a dairy farm manager, is working on a Python program to create a line graph that represents the weekly milk collection (in litres) at a dairy over five working days. The graph will help him analyse variations in milk collection during the week. However, some parts of his Python code are incomplete. Help Shrey by filling in the blanks in the following Python program. [4]

| Day | Milk collected (in litres) |
|-----------|----------------------------|
| Monday | 220 |
| Tuesday | 240 |
| Wednesday | 230 |
| Thursday | 250 |
| Friday | 260 |

Weekly Milk Collection



Help Shrey to complete the code.

```

_____ as plt                                     # Statement-1
Days = ['Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday']
Milk = [220, 240, 230, 250, 260]
_____                                           # Statement-2
plt.xlabel('Days')
plt.ylabel('Milk Collection (in Litres)')

_____                                           # Statement-3
_____                                           # Statement-4
plt.legend()
plt.show()

```

- I. Write a suitable code for the import statement in the blank against Statement-1.
- II. Write a suitable code in the blank against Statement-2, which plots the line graph with the appropriate data and includes a label for the legend.
- III. Fill in the blank against Statement-3 with the correct Python code to set a suitable title for the graph.
- IV. Fill in the blank against Statement-4 with an appropriate Python code to save the graph as an image file named `milk_collection.png`.

34. (a) Ramesh, who works as a database administrator, has created a table **HOSTEL** as shown below: [4]

Table: **HOSTEL**

| HostelID | StudentName | City | RoomType | Fees | Admission_Date |
|----------|-------------|--------|----------|-------|----------------|
| 701 | Aman Gupta | Delhi | Single | 85000 | 2021-07-10 |
| 702 | Riya Mehra | Mumbai | Double | 65000 | 2020-06-15 |
| 703 | Karan Singh | Jaipur | Single | 90000 | 2019-08-20 |
| 704 | Neha Sharma | Delhi | Tripe | 50000 | 2022-02-05 |
| 705 | Rahul Verma | Mumbai | Double | 70000 | 2021-11-25 |

Write suitable SQL query for the following:

- I. Display the StudentName and City in uppercase, sorted alphabetically by StudentName.
- II. Display the HostelID along with the name of the month in which the student was admitted to the hostel.
- III. Calculate and display the total fees of all students staying in the hostel.
- IV. Display the RoomType and the number of students staying in each room type.

OR

(b) Consider the following table **UNIVERSITY** and write the output of the given SQL queries.

Table: **UNIVERSITY**

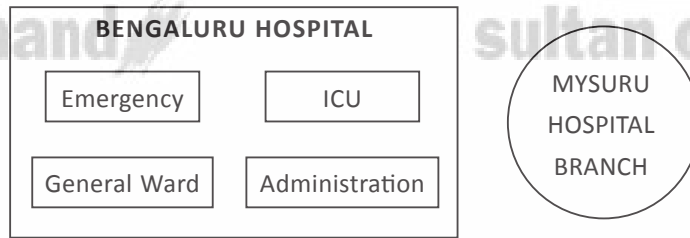
| StudentID | StudentName | Department | Admission_Date | Marks | City |
|-----------|--------------|------------------|----------------|-------|--------|
| 901 | Aarav Sharma | Computer Science | 2021-03-15 | 92 | Delhi |
| 902 | Neha Verma | Physics | 2020-01-22 | 85 | Mumbai |
| 903 | Rohan Gupta | Mathematics | NULL | 78 | Pune |
| 904 | Simran Kaur | Computer Science | 2022-03-10 | 88 | Delhi |
| 905 | Kunal Mehtra | Physics | 2021-05-05 | 95 | NULL |

Write the output of the following SQL queries:

- I. `SELECT StudentName, Marks FROM UNIVERSITY WHERE Marks BETWEEN 90 AND 100;`
- II. `SELECT LOWER(StudentName) FROM UNIVERSITY WHERE MONTH(Admission_Date) = 3;`
- III. `SELECT AVG(Marks) FROM UNIVERSITY;`
- IV. `SELECT Department, COUNT(*) FROM UNIVERSITY GROUP BY Department;`

Section E (3 × 5 = 15 Marks)

35. City Care Hospital is a multi-specialty hospital located in Bengaluru. It has four main departments: Emergency, ICU, General Ward and Administration. The hospital also has a branch in Mysuru. [5]



The distances between these departments, as well as between Bengaluru and Mysuru branches, are as follows:

| From | To | Distance (in metres) |
|--------------------|----------------|----------------------|
| Emergency | ICU | 40 |
| Emergency | General Ward | 70 |
| Emergency | Administration | 60 |
| ICU | General Ward | 50 |
| ICU | Administration | 80 |
| General Ward | Administration | 45 |
| Bengaluru Hospital | Mysuru Branch | 150 kilometres |

The number of computers in each department/branch is as follows:

| | |
|----------------|----|
| Emergency | 60 |
| ICU | 40 |
| General Ward | 50 |
| Administration | 30 |
| Mysuru Branch | 80 |

As a network engineer, you have to propose solutions for various listed queries—I to V.

- I. Suggest the most suitable department in the Bengaluru Hospital to install the main server. Also, give a reason to justify your suggested location.
- II. Which hardware device would you recommend to connect all the computers within each department?
- III. Draw a suitable cable layout of wired network connectivity between the departments in the Bengaluru Hospital.
- IV. Suggest the most appropriate type of network (LAN, MAN, WAN) to connect the Bengaluru Hospital and Mysuru Branch.
- V. When a signal is transmitted through a wire from Emergency to Administration, its strength reduces. Which device would you suggest the hospital use to solve this problem?

36. Consider the DataFrame `df` shown below:

| TestName | Department | Charges |
|------------|------------|---------|
| Blood Test | Pathology | 500 |
| X-Ray | Radiology | 1000 |
| MRI | Radiology | 5000 |
| Ultrasound | Radiology | 1500 |
| ECG | Cardiology | 800 |

Write Python statements for the following tasks:

- I. Print the last two rows of the DataFrame df.
- II. Add a new column "Discount" with values [50, 100, 500, 150, 80].
- III. Delete the column "Charges".
- IV. Rename the column "Department" to "Dept".
- V. Display only the "TestName" and "Charges" columns.

37. (a) Write suitable SQL query for the following tasks: [5]

- I. To extract the first three characters from the Company_Name column in the Stocks table.
- II. To display the total number of shares traded from the Quantity column in the Transactions table.
- III. To display the year of the Transaction_Date column from the Transactions table.
- IV. To display the City column from the Traders table after removing leading and trailing spaces.
- V. To display the current date.

OR

(b) Write suitable SQL query for the following tasks:

- I. To display the total number of characters in the string 'RadiologyLab'.
- II. Find the position of the first occurrence of the letter 'o' in the Equipment_Name column of the Equipment table.
- III. To display the total sum of the TestFee column from the LabTests table.
- IV. Calculate the square of the BillAmount for each bill in the Billing table.
- V. To display the average cost of all equipment from the Cost column in the Equipment table.