PRACTICE PAPER — 1

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 shape attribute of a DataFrame returns the number of columns only.

2. What will be the output of the following SQL command? [1]

```
SELECT MONTH('2025-11-18');
```

(a) `11` (b) `18`
(c) `November` (d) `Tuesday`

3. Websites use these small data files to identify users and record their browsing activity for a personalized experience. These files are known as: [1]
(a) Extensions (b) Cookies
(c) Bookmarks (d) Firewalls

4. Which of the following is not a string function in SQL? [1]
(a) `LENGTH()` (b) `LOWER()`
(c) `SUM()` (d) `TRIM()`

5. Kavita designed a unique logo and brand name for her company that she wants to legally protect so that no other company can use a similar design or name. Which type of intellectual property protection should Kavita apply for? [1]
(a) Patent (b) Copyright
(c) Trademark (d) Licence

6. Which attribute of a Pandas Series is used to get the data labels (index)? [1]
(a) `series.values` (b) `series.index`
(c) `series.keys()` (d) `series.items()`

7. Which function in Matplotlib is used to plot a line graph? [1]
(a) `line()` (b) `plotline()`
(c) `plots()` (d) `lineplot()`

8. State whether the following statement is True or False: [1]
The `COUNT()` function in SQL is used to return the sum of all numeric values in a column.

9. Which of the following Pandas data structures is used to store tabular data? [1]
(a) Series (b) DataFrame
(c) Array (d) Dictionary

10. Sneha's friend posted her private photos on social media without her consent and sent them to others to embarrass her. What type of cybercrime is this? [1]

(a) Cyberbullying (b) Phishing
(c) Identity theft (d) Cyberterrorism

11. Which of the following SQL functions returns the smallest integer greater than or equal to a given number? [1]

(a) `FLOOR()` (b) `CEIL()`
(c) `ROUND()` (d) `MOD()`

12. Which protocol is used to securely transfer data between a web browser and a web server? [1]

(a) FTP (b) HTTPS
(c) POP3 (d) SNMP

13. Which of the following statements will create an empty Pandas Series? [1]

(a) `s = Series([])` (b) `s = pd.Series()`
(c) `s = pd.Series([])` (d) `s = pd.Series({}, index=[])`

14. Which of the following is not a result of excessive screen time? [1]

(a) Headache (b) Neck pain
(c) Better posture (d) Blurred vision

15. Which library is mainly used for scientific and numerical computations in Python? [1]

(a) `pandas` (b) `numpy`
(c) `matplotlib` (d) `scipy`

16. With respect to SQL, match the functions/clauses in Column-II with categories in Column-I: [1]

	Column-I		Column-II
P.	Math function	(i)	`NOW()`
Q.	Clause	(ii)	`POWER()`
R.	Date function	(iii)	`COUNT()`
S.	Aggregate function	(iv)	`ORDER BY`

(a) P-(i), Q-(ii), R-(iii), S-(iv) (b) P-(iii), Q-(i), R-(ii), S-(iv)
(c) P-(iv), Q-(ii), R-(i), S-(iii) (d) P-(ii), Q-(iv), R-(i), S-(iii)

17. Which of the following Python statements is used to drop a column from a DataFrame, `df`? [1]

(a) `df = df.drop(['column_name'], axis=1)`
(b) `df = df.remove(['column_name'], axis=1)`
(c) `df = df.delete(['column_name'], axis='rows')`
(d) `df = df.clear(['column_name'], axis='columns')`

18. In Python Pandas, `DataFrame._____[]` is used for integer-based indexing with DataFrames. [1]

(a) `iloc` (b) `loc`
(c) `index` (d) `ix`

19. What does URL stand for? [1]

(a) Universal Resource Link (b) Uniform Resource Locator
(c) Uniform Reference Link (d) Universal Reference Locator

Questions 20 and 21 are Assertion(A) and Reason(R) type questions. Choose the correct options 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 but Reason (R) is not the correct explanation for Assertion (A).
(c) Assertion (A) is True and Reason (R) is False.
(d) Assertion (A) is False but Reason (R) is True.

20. **Assertion (A):** A Pandas DataFrame can be created from a dictionary. [1]
Reason (R): In a dictionary, keys become column names and values become column data.

21. **Assertion (A):** The `AVG()` function in SQL calculates the average value including NULL values. [1]
Reason (R): SQL functions ignore NULL values by default when performing aggregate calculations.

Section B (7 × 2 = 14 Marks)

22. (a) Mention any two main points of difference between iloc[] and loc[] indexing functions in Python. [2]

Or

(b) How does a DataFrame object specify indexes to its data rows?

23. A school plans to set up a new computer lab and is considering using open-source software instead of commercial alternatives to reduce costs. [2]

(a) Explain how using open-source software can help the school manage its budget effectively.

(b) Give any two examples of open-source software.

24. Consider the string "Python Programming Language" and write suitable SQL queries for the following: [2]

(a) To remove any leading or trailing spaces from the string.

(b) To extract 10 characters starting from the 8th character.

25. (a) Write some major functions carried out by a web browser. [2]

Or

(b) What is the role of a gateway in a network?

26. What is a Relational Database Management System (RDBMS)? Mention any two examples of RDBMS. [2]

27. List any four benefits of e-waste management. [2]

28. (a) Sakshi is trying to create a Pandas Series of marks scored by students. Her code has some mistakes. Rewrite the correct code and underline the corrections made. [2]

```
import panda as pd
score = pd.Series([65, 80, 87, 79], index = ["Jai", "Divyam", "Mohit",
"Inaaya"]
print(score)
```

Or

(b) Complete the given Python code to generate the following output:

	DAY	TEMPERATURE
0	Monday	25
1	Tuesday	28
2	Wednesday	30

```
import _______ as pd
temps = [25, 28, 30]
days = ['Monday', 'Tuesday', 'Wednesday']
data = pd._________({'DAY': days, 'TEMPERATURE': _________})
print(_________)
```

Section C (4 × 3 = 12 Marks)

29. Reyansh, a Class 12 student, loves spending time on social media platforms. He frequently posts pictures, comments on his friend's posts and shares his thoughts online. Recently, he noticed that even people he doesn't know have started liking and commenting on his posts. He also realized that when he searches his name on the internet, some of his old photos and comments appear in the search results. This makes him wonder how his online activities are visible to others and how he can act more responsibly. [3]

(a) What is a digital footprint and how is it created?

(b) Write any two net etiquette that Reyansh should follow to ensure respectful and responsible online behaviour.

(c) How can Reyansh protect himself from cyberbullying? Mention any one protective measure.

30. (a) Write a Python program to create the following DataFrame using a Dictionary of Series: [3]

	Product	Price	Quantity
0	Chair	1500	100
1	Table	3000	50
2	Lamp	500	200
3	Sofa	5000	20

Or

(b) Write a Python program to create a Pandas Series as shown below from an ndarray containing the numbers `10, 15, 12, 8` with corresponding indices `'Red', 'Blue', 'Green', 'Yellow'`.

Red	10
Blue	15
Green	12
Yellow	8

31. (a) Write an SQL statement to create a table, `Courses`, with the following specifications: [2+1=3]

Table: COURSES

Column Name	Data Type	Key
Course_ID	Integer	Primary Key
Course_Name	Varchar(60)	
Duration	Float	
Fees	Int	
Instructor	Varchar(40)	

(b) Write an SQL query to display all the unique records in ascending order of `Fees` from the table `Courses`.

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

Table: CARS

CAR_ID	BRAND	MODEL	MFG_YEAR
C101	Toyota	Corolla Altis	2020
C102	Honda	City ZX	2022
C103	Hyundai	Creta	2021
C104	Kia	Seltos	2023
C105	Tata	Nexon EV	2022

Table: SERVICE_RECORD

CAR_ID	SERVICE_TYPE	SERVICE_COST
C101	General Check	2500
C102	Engine Repair	5500
C103	Tyre Change	4000
C104	Battery Check	1800
C105	Full Service	6000

Write SQL queries for the following:

(i) To display the number of car brands from each manufacturing year.

(ii) To find the average service cost of cars having a car id is more than `'C102'`.

(iii) To list the service type and cost of all the cars.

Or

(b) Consider the following tables:

Table 1: DOCTORS

This table stores basic details of doctors available in the hospital.

Doctor_ID	Doctor_Name	Specialization	Experience_Years
D101	Dr. Meena Roy	Cardiology	12
D102	Dr. Amit Kumar	Orthopaedics	8
D103	Dr. Priyanka Shah	Paediatrics	10
D104	Dr. Rohit Khanna	Neurology	15
D105	Dr. Neeru Jain	Dermatology	7

Table 2: PATIENTS

This table records details of patients attended by doctors in the hospital.

Patient_ID	Patient_Name	Doctor_ID	Visit_Date
P301	Anurag Sharma	D101	2026-01-10
P302	Minal Shah	D102	2026-01-15
P303	Kanika Kapoor	D103	2026-02-10
P304	Sanvi Mehta	D104	2026-03-05
P305	Yash Rai	D105	2026-04-12

Write SQL queries for the following:

(i) To delete those records from table `PATIENTS` whose doctor id is below `'D103'`.

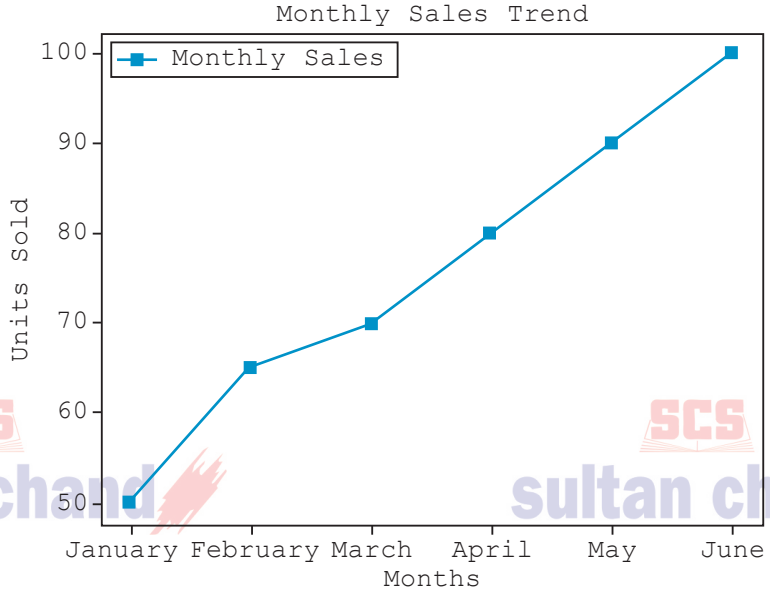
(ii) To display the names of all doctors whose experience is more than 10 years.

(iii) To display the doctor names along with their corresponding visit date.

Section D (2 × 4 = 8 Marks)

33. Anayra has to fill in the blanks in the given Python program that generates a line plot as shown below. The given line plot represents the monthly sales (in units) of a store for the first six months of the year. The sales data is as follows: [4]

Month	Sales (Units)
January	50
February	65
March	70
April	80
May	90
June	100



```
import _____ as plt          # Statement-1
months = ['January', 'February', 'March', 'April', 'May', 'June']
sales = [50, 65, 70, 80, 90, 100]
plt.plot(months, _____, color='green', marker='s', label='Monthly Sales')
                             # Statement-2
plt.xlabel('_____')          # Statement-3
plt.ylabel('Units Sold')
plt.legend()
plt.title('_____')           # Statement-4
plt.show()
```

Write the missing statements according to the given specifications:

(a) Write the suitable code to import the required module in the blank space in the line marked as Statement-1.

(b) Fill in the blank in Statement-2 with a suitable Python code.

(c) Refer to the graph shown and fill in the blank in Statement-3 to display the appropriate label for x-axis.

(d) Refer to the graph shown and fill in the blank in Statement-4 to display the suitable chart title.

34. (a) A gym maintains a database to manage its membership and payment records. The database includes a table named `MEMBERSHIPS` with the following attributes: [4]

MEMBER_ID: Stores the unique ID for each member.

NAME: Stores the member's name.

PLAN_TYPE: Stores the type of gym plan chosen (Monthly, Quarterly, Yearly).

JOIN_DATE: Stores the date when the member joined the gym.

FEES_PAID: Stores the total fees paid by the member.

Table: MEMBERSHIPS

MEMBER_ID	NAME	PLAN_TYPE	JOIN_DATE	FEES_PAID
M201	Arika Sharma	Monthly	2026-01-05	1200
M202	Riyansh Gupta	Quarterly	2025-12-20	3000
M203	Kimaya Mehta	Yearly	2025-11-25	11000
M204	Sanvi Kapoor	Monthly	2026-02-01	1500
M205	Aditi Singh	Quarterly	2025-12-30	3200

Write SQL queries for the following:

(i) To add a new record with following specifications:

```
MEMBER_ID: 'M206'
NAME: 'Yuvish Gupta'
PLAN_TYPE: 'Quarterly'
JOIN_DATE: '2026-02-10'
FEES_PAID: 5500
```

(ii) To display the member's name with the highest fees.

(iii) To display the members' name in upper case.

(iv) To display the total revenue collected from members having `MEMBER_ID` below `'M203'`.

Or

(b) A college maintains a database of its faculty members. The database includes a table named `FACULTY` with the following attributes:

FACULTY_ID: Stores the unique ID for each faculty member.

NAME: Stores the name of the faculty member.

DEPARTMENT: Stores the department in which the faculty member teaches.

EXPERIENCE: Stores the years of teaching experience.

SALARY: Stores the monthly salary of the faculty member.

Table: FACULTY

FACULTY_ID	NAME	DEPARTMENT	EXPERIENCE	SALARY
F101	Dr. Kavisha Minhas	Chemistry	12	80000
F102	Mr. Rakul Verma	Mathematics	7	60000
F103	Ms. Tara Arora	English	5	45000
F104	Dr. Devender Luthra	Physics	9	70000
F105	Ms. Siya Tayal	Computer Science	4	50000

Write the output of the following SQL queries:

(i) `SELECT NAME, DEPARTMENT FROM FACULTY WHERE EXPERIENCE >= 7;`

(ii) `SELECT LENGTH(NAME) FROM FACULTY WHERE DEPARTMENT = 'English';`

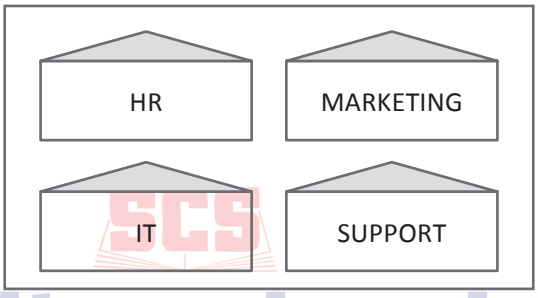
(iii) `SELECT NAME, SALARY FROM FACULTY WHERE SALARY BETWEEN 45000 AND 70000;`

(iv) `SELECT MAX(SALARY) FROM FACULTY;`

Section E (3 × 5 = 15 Marks)

35. XYZ Solutions, Bengaluru, is a company that deals with software development and cloud computing projects. They have different divisions: **HR, MARKETING, IT** and **SUPPORT**. [5]

The layout of the Bengaluru branch is:



The management wants to connect all the divisions as well as the computers of each division (HR, MARKETING, IT and SUPPORT).

Distance between the divisions is as follows:

HR to MARKETING	75 m
HR to IT	90 m
HR to SUPPORT	55 m
MARKETING to IT	120 m
MARKETING to SUPPORT	140 m
IT to SUPPORT	100 m

Number of computers in each division:

Division	Number of Computers
HR	30
MARKETING	80
IT	150
SUPPORT	25

Based on the above specifications, answer the following questions:

(a) Suggest the topology and draw the most suitable cable layout for connecting all the divisions in the Bengaluru office.

(b) XYZ Solutions is having its head office in Germany. Out of LAN, MAN and WAN, which kind of network will be created to connect the Bengaluru office with the Germany office? Justify your answer.

(c) Suggest the division for the placement of the server. Explain the reason for your selection.

(d) Suggest the placement of Switch/Hub with justification.

(e) Where will a repeater be placed in the suggested network layout? Justify your answer.

36. Consider the DataFrame `Library` shown below: [5]

	BookID	Title	Author	Price
0	301	Python Basics	J. Smith	450
1	302	Data Science	A. Kumar	600
2	303	Machine Learning	R. Gupta	750
3	304	AI Fundamentals	L. Mehta	800
4	305	Database Systems	S. Reddy	650

Write suitable Python statements for the following:

(a) To print the last two rows of the DataFrame `Library`.

(b) To display the titles of all books.

(c) To add a new column `'Discount'` with value `100` for all books.

(d) To display rows with index `0` and `3`.

(e) To delete the column `'Author'`.

37. (a) Write SQL queries for the following: [5]

(i) To display the sum total of all the values of the `Experience` column from the `TEACHERS` table.

(ii) To display the first six characters of the `Subject` column from the `TEACHERS` table.

(iii) To display the value of `TEACHER_NAME` column from the `TEACHERS` table, after removing the trailing spaces.

(iv) To retrieve the maximum experience from the `Experience` column of the `TEACHERS` table.

(v) To increase the number of lectures of all the teachers by 1, in the `TEACHERS` table. (The name of the column is `NO_OF_LECTURES`)

Or

(b) Write suitable SQL query for the following:

(i) To calculate the square of `19`.

(ii) To round the number `897.562` to the nearest integer.

(iii) To display the position of first occurrence of `'info'` in the string `'information informatics technology'`.

(iv) To display the name of the day for the date `'2026-02-19'`.

(v) To display the current date and time.