

SOLVED

Sample Question Paper-2

Time Allowed: 3 hours

Maximum Marks: 70

General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.

SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

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

The axis=1 argument in the drop() method is used to drop columns in a DataFrame.

[M] [1]

2. What will be the output of the following SQL query?

SELECT ROUND(12.789, 1);

[M] [1]

- (a) 12.7 (b) 12.8 (c) 12.78 (d) 13.0

3. An online attacker accessed the files on Neha's computer without her permission by exploiting a network vulnerability. This act is known as:

[E] [1]

- (a) Cyber Bullying (b) Hacking (c) Plagiarism (d) Phishing

4. Which function is used to display the first 5 rows of a Pandas DataFrame by default?

 [E] [1]

- (a) df.tail() (b) df.show() (c) df.head() (d) df.top()

5. Which device is used to connect different networks and route data between them?

 [E] [1]

- (a) Switch (b) Router (c) Hub (d) Repeater

6. Which SQL function is used to return a number rounded to the nearest integer value (either higher or lower depending on the decimal part)?

[M] [1]

- (a) ROUND() (b) FLOOR() (c) CEIL() (d) TRUNC()

7. Priya created a logo for her handmade soap business. What type of IPR protects her logo from being copied?

[H] [1]

- (a) Patent (b) Copyright (c) Trademark (d) Design

8. Which of the following can be used as data when creating a Pandas Series?

[M] [1]

- (a) List (b) Dictionary (c) Numpy array (d) All of the above

9. Which of the following keys uniquely identifies each record in a table?

[E] [1]

- (a) Foreign key (b) Alternate key (c) Primary key (d) Composite key

- 10.** Which of the following technologies allows users to store, access, and manage data online instead of on a local device? [M] [1]
 (a) VoIP (b) Cloud Computing (c) Circuit Switching (d) Bluetooth
- 11.** Which function is used to calculate the total sum of values in a numeric column? [E] [1]
 (a) MAX() (b) SUM() (c) COUNT() (d) TOTAL()
- 12.** What will be the result of adding a scalar value to a Pandas Series? [H] [1]
 (a) The scalar is added only to the first element (b) The scalar is added only to the last element
 (c) The scalar is added to all elements (d) Error occurs
- 13.** Which of the following is not considered a cybercrime under the IT Act, 2000? [E] [1]
 (a) Data theft (b) Cyberstalking (c) Physical assault (d) Phishing
- 14.** What is the default sorting order when using the ORDER BY clause in SQL? [M] [1]
 (a) Descending (b) Alphabetical (c) Random (d) Ascending
- 15.** Which method is used to access rows by their integer position rather than labels? [M] [1]
 (a) df.loc[] (b) df.iloc[] (c) df.index() (d) df.select()
- 16.** Which network topology requires the maximum number of cables and network interfaces? [M] [1]
 (a) Star (b) Mesh (c) Ring (d) Bus
- 17.** Which SQL function is used to convert all characters in a string to lowercase? [M] [1]
 (a) LOWER() (b) LWCASE() (c) TO_LOWER() (d) downcase()
- 18.** Which of the following statements is used to view the first 5 rows of a DataFrame named *df*? [E] [1]
 (a) df.head() (b) df.top() (c) df.first(5) (d) df.peak()
- 19.** What does the COUNT(*) function return? [E] [1]
 (a) Number of columns in the table (b) Number of rows in the table
 (c) Number of NULL values (d) Number of primary keys
- 20. Assertion (A):** The df.head() function in Pandas returns the last 5 rows of a DataFrame.
Reason (R): The head() method is used to view the initial rows of a DataFrame. [E] [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.
- 21. Assertion (A):** The GROUP BY clause in SQL is used with aggregate functions to group the result-set by one or more columns.
Reason (R): Aggregate functions like COUNT(), AVG(), and MAX() operate only on grouped data. [D] [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.

SECTION-B

- 22. (a)** Highlight any two key differences between a Series and a DataFrame in Python's Pandas library. [E] [2]
 OR
(b) Given the Series name as S_marks [E M]

Student	Marks
Raj	88
Simran	45
Ali	67
Maya	91

(i) Display marks of students who scored above 70. [H]
(ii) Set the Series name to "Exam Scores". [E]
- 23.** Ravi, an IT professional working in a finance company, accessed confidential customer records without permission and shared the data with a third-party vendor in exchange for money. His employer discovered the breach during an audit.
(i) Which cyber law is violated in this scenario?
(ii) Suggest any two preventive measures an organization can implement to avoid such misuse. [H] [2]

24. Assume the string "Class 12 IP Practical". Write SQL queries to:

- Display the position of the word 'IP' in the string.
- Count the total number of characters (including spaces).

 [M] [2]

25. (a) What is the difference between Static static and dynamic webpage?

[E] [2]

OR

(b) Difference between WWW and Internet.

[E] [2]

26. What are aggregate functions in SQL? Name any two.

[E] [2]

27. Explain Plagiarism with an example.

[E] [2]

28. (a) Riya is learning how to use Pandas and is trying to create a Series of integers. She writes the following code, but it does not work as expected. Help her by rewriting the corrected version and underline the parts where she made mistakes.

```
import Pandas
val = [10, 20, 30]
s = pd.Series(val, index = ['a', 'b' 'c'])
print(S)
```

[M] [2]

OR

(b) Complete the Python code to display the following output using a DataFrame:

ITEM	PRICE
0 Pen	10
1 Pencil	5
2 Eraser	7

```
import as pd
data = [{'ITEM':'Pen','PRICE':10},
        {'ITEM':'Pencil','PRICE':5},
        {_____}]
df = pd.DataFrame(_____)
print(_____)
```

 [E] [2]

SECTION-C

29. Ritika is a Class 12 student who actively participates in online webinars, shares academic content on social media, and subscribes to several educational platforms. One day, she receives a suspicious email asking for her login credentials. She also realizes that her personal details are visible on multiple public forums without her knowledge. Ritika becomes worried about how her data is being collected and used. Help Ritika by answering the following questions:

- What do you understand by digital privacy? Why is it important?
- Suggest any two precautions Ritika should take while sharing personal data online.
- What should Ritika do if she receives a suspicious or phishing email?

 [M] [3]

30. (a) Write a Python program to create a Series as shown below using a dictionary. Note that left column indicates the indices and the right column displays the data.

Fiction	F
Non Fiction	NF
Drama	D
Poetry	P

[E] [3]

OR

(b) Write a Python program to generate the following DataFrame using a Dictionary of Series:


Brand	Type
0 Nike	Shoes
1 Samsung	Phone
2 Dell	Laptop
3 Titan	Watch

[E] [3]

31. (i) Write the SQL statement to create a table, Employee, with the following specifications:

Column Name	Data Type	Key
-------------	-----------	-----

EID	Int	Primary Key
EName	Varchar (40)	
Department	Varchar (30)	
Salary	Int	

- (ii) Write the SQL query to display the EName and Salary of all employees working in the 'IT' department, in descending order of Salary.  [E] [3]

32. Given the following tables:

Table: BOOKS

BOOK_ID	TITLE	AUTHOR_ID	PRICE
1	The Great Novel	1	25.00
2	Coding Basics	2	30.00
3	Mystery Solved	1	22.50
4	Data Structures	3	35.00
5	Epic Journey	2	28.00

Table: AUTHORS

AUTHOR_ID	AUTHOR_NAME	COUNTRY
1	A.B. Writer	USA
2	C.D. Coder	India
3	E.F. Expert	UK

Write SQL queries for the following:

- (i) To display the number of books written by each author.
(ii) To find the average price of all books.
(iii) To list the titles of books and the names of their respective authors.

[M] [3]

SECTION-D


33. Ravi wants to create a line plot to represent the sales (in thousands) for five months. The table below shows the data:

Month	Sales (in '000)
January	15
February	18
March	21
April	19
May	22

He writes the following Python program but misses a few statements. Fill in the blanks to complete it:

```
import _____ as plt # Statement-1
months = ['Jan', 'Feb', 'Mar', 'Apr', 'May']
sales = [15, 18, 21, 19, 22]
plt.____(months, sales) # Statement-2
plt.xlabel('_____') # Statement-3
plt.ylabel('Sales (in 000)')
plt.title('_____') # Statement-4
plt.show()
```

Write the missing statements according to the given specifications:

- (i) Write the suitable code to import the required module in the blank space in the line marked as Statement-1.
(ii) Fill in the blank in Statement-2 with a suitable Python function name to create a line plot.
(iii) Refer to the graph shown and fill in the blank in Statement-3 to display the appropriate label for the x-axis.
(iv) Refer to the graph shown and fill in the blank in Statement-4 to display the suitable chart title.  [E] [4]

34. (a) An online store maintains a database of products. The database includes a table PRODUCTS with the following attributes:

- **P_ID**: Stores the unique product ID.
- **P_NAME**: Stores the name of the product.
- **CATEGORY**: Stores the category of the product.
- **PRICE**: Stores the price of the product.

Table: PRODUCTS

P_ID	P_NAME	CATEGORY	PRICE
P101	Headphones	Electronics	1500
P102	Running Shoes	Footwear	2500
P103	Backpack	Accessories	1200
P104	LED Bulb	Electronics	500
P105	T-shirt	Clothing	800

Write SQL queries for the following:

- (i) Add a new product with:
 - P_ID: P106
 - P_NAME: Smart Watch
 - CATEGORY: Electronics
 - PRICE: 3500
- (ii) Display all products in the "Electronics" category.
- (iii) Find the total number of products in the "Footwear" category.
- (iv) Display all product names in uppercase.



OR

- (b) An institution maintains a table named STUDENT for student records with the following structure:
 - **SID**: Unique student ID
 - **S_NAME**: Name of the student
 - **CLASS**: Class enrolled in
 - **FEES**: Annual fees
 - **ADM_DATE**: Date of admission

Table: STUDENT

SID	S_NAME	CLASS	FEES	ADM_DATE
S01	RIA MEHRA	12-COM	42000	2020-06-15
S02	ADITYA RAO	11-SCI	45000	2021-08-10
S03	NISHA JAIN	12-ARTS	40000	2022-04-20
S04	VIKAS SINGH	11-COM	43000	2021-06-05
S05	ALI KHAN	12-SCI	47000	2019-07-25

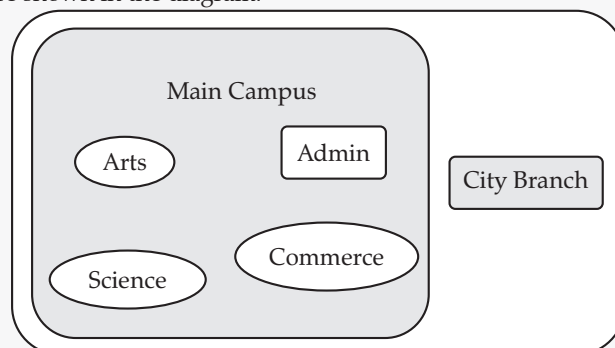
Write the output of the following SQL queries:

- (i) SELECT UPPER(S_NAME) FROM STUDENT WHERE CLASS = '12-COM';
- (ii) SELECT S_NAME FROM STUDENT WHERE MONTH(ADM_DATE) = 6;
- (iii) SELECT S_NAME FROM STUDENT WHERE FEES > 43000;
- (iv) SELECT COUNT(CLASS) FROM STUDENT;



SECTION-E

35. "Great Achievers College" has its main campus in a suburban area and its branch is situated in the township. The buildings at these places are shown in the diagram.



Distance between the blocks are given below:

Admin to science	85 m
Admin to commerce	120 m
Admin to Arts	75 m
Science to commerce	80 m
Science to Arts	70 m
Commerce to Arts	60 m
township to main campus	6 kg

Numbers of Computers in the blocks given are as

Admin	100
Science	80
Commerce	50
Arts	20
City branch	60

- Name the device that will be to protect the network from unwanted and unauthorised accesses from outside the network.
- Which Topology is suggested in your layout scheme for the main campus?
- Which block will be appropriate for the server in teh main campus, and given reason.
- Suggest most reliable and low-maintenance connection for the campus with its city branch in the township.
- Suggest the placement of the following devices with justification if the company wants to minimised network traffic.
 - Repeater
 - Hub/Switch

 [M] [5]

36. Consider the following DataFrame **Student**.

	RollNo	Name	Class	Marks
0	201	Ria Mehra	12A	88
1	202	Aditya Rao	12B	92
2	203	Nisha Jain	12A	79
3	204	Vikas Shah	12C	85
4	205	Ali Khan	12B	90

Write suitable Python statements for the following:

- To display the first three rows of the DataFrame **Student**.
- To display the values under the **Name** column.
- To add a new column, **Grade**, with the value 'A' for all students.
- To display rows with index 1 and 4.
- To remove the column **Class**.

 [H] [5]

37. (a) Write SQL queries for the following based on the table **EMPLOYEES**:

- To find the average salary from the SALARY column.
- To display the first 4 letters of the EMP_NAME column.
- To display the EMP_NAME values after converting them to lowercase.
- To retrieve the maximum salary from the SALARY column.
- To increase the BONUS column value by 500 for all employees.

[H] [5]

OR

(b) Write SQL queries for the following:

- To find the cube of 8.
- To extract the month from the date '2025-02-15'.
- To find the length of the string 'Digital Learning'.
- To extract the year from '2023-12-10'.
- To display the current system date.

 [H] [5]

□□□

SOLVED

Sample Question Paper-3

Time Allowed: 3 hours



Maximum Marks: 80





General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.



SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

1. State whether the following statement is True or False:
The loc[] method can only be used to access rows, not columns, in a DataFrame.  [M] [1]
2. What will be the result of the following SQL query?
SELECT LENGTH('Informatics'); [E] [1]
(a) 11 (b) 10 (c) 9 (d) 12
3. A student downloaded a paid antivirus software for free from an unknown website and began distributing it among friends. This act violates: [H] [1]
(a) Cyber Security Policy (b) Data Protection
(c) Intellectual Property Rights (d) Privacy Rights
4. Which argument should be passed to `df.to_csv()` to **avoid writing the index** to the file? [E] [1]
(a) `no_index=True` (b) `index=False` (c) `index=false` (d) `index:False`
5. A device that is used to **forward data** only to the intended device in a network is called: [E] [1]
(a) Hub (b) Modem (c) Switch (d) Repeater
6. Which SQL function will return 8 when applied 7.8? [M] [1]
(a) POWER() (b) FLOOR() (c) ROUND() (d) MOD()
7. Which of the following is **protected under copyright law**? [H] [1]
(a) Slogan of a brand (b) An algorithm
(c) A poem written by a student (d) A company name
8. Which attribute returns the **index labels** of a Pandas Series?  [E] [1]
(a) `series.items` (b) `series.labels` (c) `series.index` (d) `series.head()`
9. Which of the following can be considered a **candidate key**? [H] [1]
(a) Only one column
(b) Any attribute or combination that uniquely identifies a row

- (c) Only the primary key
(d) Only foreign key
- 10.** Which application enables **real-time voice communication over the Internet**? [E] [1]
(a) FTP (b) VOIP (c) SMTP (d) HTTP
- 11.** What does `AVG(salary)` compute in SQL?  [H] [1]
(a) Maximum salary (b) Sum of all salaries
(c) Average of non-NULL salaries (d) Number of salary entries
- 12.** Which method is used to **fill NaN values** in a Series with a specific value? [M] [1]
(a) `fill_value()` (b) `replace()` (c) `fillna()` (d) `dropna()`
- 13.** Under the IT Act, 2000, which of the following is treated as a punishable offence?  [E] [1]
(a) Installing licensed software (b) Unauthorised access to someone's computer
(c) Opening an email account (d) Browsing educational websites
- 14.** Which SQL keyword is used to **arrange rows in descending order** based on a column's value? [E] [1]
(a) ORDER DESC (b) SORT DOWN
(c) ORDER BY column name DESC (d) GROUP DESC
- 15.** What will `df.iloc[:3]` return?  [M] [1]
(a) Last 3 rows of `df` (b) Rows from index 3 to end
(c) First 3 rows of `df` (d) Only row with index 3
- 16.** Which of the following topologies has a **single point of failure** at the central node? [E] [1]
(a) Mesh (b) Tree (c) Ring (d) Star
- 17.** Which SQL function removes **leading and trailing spaces** from a string?  [E] [1]
(a) REMOVE() (b) STRIP() (c) TRIM() (d) CUT()
- 18.** Which function returns basic statistical details like mean, std, min and max of a DataFrame? [H] [1]
(a) `df.info()` (b) `df.describe()` (c) `df.stats()` (d) `df.summary()`
- 19.** Which function will return the smallest value in a numeric column? [E] [1]
(a) LOW() (b) SMALL() (c) MIN() (d) LEAST()
- 20. Assertion (A):** The expression `df.loc[2]` accesses the row with index label 2 in a DataFrame.
Reason (R): The `loc[]` method is label-based, while `iloc[]` is integer-location based. [E] [1]
(a) Both A and R are True, and R correctly explains A.
(b) Both A and R are True, but R does not correctly explain A.
(c) A is True, but R is False.
(d) A is False, but R is True.
- 21. Assertion (A):** The UPDATE command can be used to modify the structure of an existing table in SQL.
Reason (R): UPDATE is a DML command used to update existing records in a table. [E] [1]
(a) Both A and R are True, and R correctly explains A.
(b) Both A and R are True, but R does not correctly explain A.
(c) A is True, but R is False.
(d) A is False, but R is True.

SECTION-B

- 22.** (a) Explain any two ways to create a Series in Pandas with an example. [M] [2]
OR
(b) Define plagiarism. How can students avoid committing plagiarism in their digital work?
- 23.** Define plagiarism. How can students avoid committing plagiarism in their digital work?  [E] [2]
- 24.** Given string: 'Artificial Intelligence'. Write SQL statements to:
(i) Extract 'Intel' from the string.
(ii) Display string in uppercase. [M] [2]
- 25.** (a) What is the difference between a Web Browser and a Search Engine?  [M] [2]
OR
(b) What is a firewall? How does it help in ensuring computer security?
- 26.** What is a Foreign Key? How does it help in maintaining referential integrity? [H] [2]

27. Suggest two good cyber hygiene practices to ensure safe internet usage. [E] [2]

28. (a) Kunal is trying to create a DataFrame using a dictionary of lists but encounters an error. Identify and correct the error.

```
import pandas as pd
data = { 'Name': ['Amit', 'Riya', 'Kunal'], 'Age': [15, 14] }
df = pd.dataframe(data)
print(df)
```

 [M] [2]

OR

(b) Complete the code to display only the capital cities using index labels. Output:

```
Delhi      90
Mumbai     87
Kolkata    85

import pandas as pd
data = [90, 87, 85]
cities = ['Delhi', 'Mumbai', 'Kolkata']
s = pd.Series(_____, index=_____)
print(s)
```

SECTION-C

29. Kabir's school organises a 'Tech for Trees' program where students exchange old electronics for saplings.

- What values does this initiative promote among students?
- State one benefit of integrating environmental education with technology.
- Name an NGO or policy promoting e-waste awareness in India.

[M] [3]

30. (a) Create a DataFrame for Cities and their Population.

City	Population
Delhi	19800000
Mumbai	20400000
Bangalore	12300000
Kolkata	14600000

[M] [3]

OR

(b) Create a Pandas Series using a dictionary to show Fruits and their Colours.

Index	Value
Apple	Red
Banana	Yellow
Kiwi	Green

31. (i) Create a table COURSES with the following columns:

Column Name	Data Type	Key
CourseID	Integer	Primary Key
CourseName	Varchar(40)	
Duration	Integer	

- Later, add a new column Fees with data type Float(8,2).
- Insert a record: 201, "Python Programming", 60, 15000.00

[H] [3]

32. Consider the given two tables:

Table: STUDENTS

RollNo	Name	City	Class
101	Asha	Delhi	12
102	Rohan	Mumbai	11
103	Neha	Delhi	12
104	Aarav	Pune	11
105	Kriti	Delhi	12

Table: MARKS

RollNo	Subject	Marks
101	IP	85

101	Maths	90
102	IP	78
103	Maths	95
104	IP	88
105	IP	92

Write SQL queries for:

- Display the average marks of students subject-wise.
- Display names and cities of students who scored more than 85 in IP.
- Display city-wise count of students.

[M] [3]

SECTION-D

33. During a Python assignment, a student Neha, was asked to generate a bar chart that displays the number of hours studied by 4 students in a week:

Diagram

Student	Hours
Aryan	6
Bhavya	8
Chirag	5
Divya	7

Complete the following code by filling in the blanks:

```
import _____ as plt # Statement-1
students = ['Aryan', 'Bhavya', 'Chirag', 'Divya']
hours = [6, 8, 5, 7]
plt.bar(_____, _____, label='Study Hours') # Statement-2
plt._____('Students') # Statement-3
plt.ylabel('Hours')
plt.title('_____') # Statement-4
plt.legend()
plt.show()
```

 [E] [4]

34. (a) Riya, who works as a database designer, has developed a database for a school transport.

This database includes a table Bus whose column (attribute) names are mentioned below:

Rtno: Shows the unique code for the route.

AreaCovered: Area covered by each bus.

Capacity: No. of seats.

Noofstud: No. of students assigned.

Distance: Distance covered by Bus.

Transporter: Transporter name

Charges: Charges of transporter

SchoolBus

Rtno	AreaCovered	Capacity	Noofstud	Distance	Transporter	Charges
1	Vasant_kunj	100	120	10	Shivam Travels	1,00,000
2	Hauz Khas	80	80	10	Anand Travels	95,000
3	Pitampura	60	55	30	Anand Travels	60,000
4	Rohini	100	90	35	Shivam Travels	75,000
5	Yamuna Vihar	50	60	30	Anand Travels	55,000

- Write an SQL query to count number of school bus transporter-wise.
- Write an SQL query to show transporter-wise average charges for all routes having charges more than 60,000.
- Write an SQL query to show transporter-wise total number of students travelling.
- Write an SQL query to show transporter-wise maximum capacity.

[H] [4]

OR

- (b) A cosmetic company has maintained a database for its company. The database includes a table name called Fashion, which stores the details of the cosmetic products along with their price and quantity.

Table: Fashion

ID	Product	Price	Qty
----	---------	-------	-----

F01	Kajal	970	10
F02	Foundation	2,100	15
F03	Night Cream	1,700	20
F04	Day Cream	1,400	10
F05	Shampoo	1,200	25
F06	Lipstick	850	32

- (i) Select count(*) from fashion;
- (ii) Select sum(Price*Qty) from fashion;
- (iii) Select left(Product, 4) from fashion;
- (iv) Select Max(Price) from fashion;

SECTION-E

- 35.** XYZ is a professional consultancy company. The company is planning to set up their new offices in India with its hub at Pune. As a network adviser, you have to understand its requirement and suggest the best available solutions. Their queries are mentioned as (I) to (V) below:

Physical locations of the blocks Block to Block distance (in Metres):

From To Distance

Human Resource Conference 110

Human Resource Finance 40

Conference Finance 80

Expected number of computers to be installed in each block:

Block Computers

Human Resource 25

Finance 120

Conference 90

- (i) What will be the most appropriate block, where XYZ should plan to install their server?
- (ii) Draw a block diagram showing the cable layout to connect all the buildings in the most appropriate manner for efficient communication.
- (iii) What will be the best possible connectivity out of the following you will suggest to connect the new setup of offices in Chennai with its London-based office.
 - Satellite link
 - Infrared
 - Ethernet cable
- (iv) Which of the following devices you will suggest to connect each computer in each of the buildings?
 - Switch
 - Modem
 - Gateway
- (v) Which type of network out of the following is formed by connecting the computers of these three blocks?
 - LAN
 - MAN
 - WAN

[M] [5]

- 36.** Consider the given dataframe:

DataFrame: df_books

Code	Title	Author	Price	Marks
B1	WINGS OF FIRE	APJ Abdul Kalam	350	88
B2	IGNITED MINDS	APJ Abdul Kalam	300	92
B3	THE MONK WHO SOLD...	Robin Sharma	250	79
B4	A BRIEF HISTORY OF TIME	Stephen Hawking	450	85
B5	THE ALCHEMIST	Paulo Coelho	275	90

Write the python code to execute the following:

- (i) Display books with price above 300.

- (ii) Remove the column 'Author'.
- (iii) Print the first 3 rows.
- (iv) Rename 'Price' to 'Cost'.
- (v) Display the column title.

[H] [5]

37. (a) Write a suitable SQL query for the following:

- (i) Display the last 3 characters of Registration_Number.
- (ii) Show all owner names in uppercase.
- (iii) Count how many vehicles are registered.
- (iv) Display the total length of each registration number.
- (v) Display owner names without extra leading/trailing spaces.



[M] [5]

OR

(b) Write the SQL statement for the following:

- (i) Display the maximum salary.
- (ii) Display the average salary.
- (iii) Count employees earning more than 40,000.
- (iv) Display names of employees in lowercase.
- (v) Show total number of employees.

□□□

SOLVED

Sample Question Paper-4

Time Allowed: 3 hours



Maximum Marks: 80





General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.



SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

1. State whether the following statement is True or False:
Statement: The `iloc[]` method in Pandas is used to access data using integer indexes. [M] [1]
2. Which SQL function returns the current date from the system? [M] [1]
(a) `SYSDATE` (b) `CURDATE()` (c) `NOW()` (d) All of the above
3. Aryan continuously sends insulting messages to his classmate on social media with the intention of threatening him. This is an example of:  [E] [1]
(a) Hacking (b) Phishing (c) Cyber Bullying (d) Identity Theft
4. Which method is used to get the summary statistics (like mean, count, std, etc.) of numerical columns in a DataFrame? [H] [1]
(a) `df.stats()` (b) `df.describe()` (c) `df.summary()` (d) `df.info()`
5. Which device broadcasts data to all connected devices, regardless of the destination? [E] [1]
(a) Switch (b) Hub (c) Router (d) Modem
6. What is the result of `MOD(17, 5)`? [M] [1]
(a) 3 (b) 2 (c) 1 (d) 4
7. Which of the following cannot be protected under a patent? [H] [1]
(a) A new machine design (b) A mathematical formula
(c) A mobile app with new technology (d) A drug formulation
8. Which of the following statements is True about Pandas Series indexing?  [E] [1]
(a) Index labels must be strings (b) Indexes cannot be changed
(c) Index can contain duplicate values (d) Index always starts from 1
9. In a table, if Email and PhoneNumber both can uniquely identify a student, then they are: [H] [1]
(a) Foreign keys (b) Composite keys (c) Candidate keys (d) Super keys

10. Which one of the following is not an example of cloud storage? [E] [1]
 (a) Google Drive (b) Dropbox (c) iCloud (d) VLC Media Player
11. To find the highest value in a column, which SQL function is used?  [H] [1]
 (a) HIGH() (b) MAX() (c) TOP() (d) CEIL()
12. If two Series with partially overlapping indices are subtracted, what happens to non-matching indices? [M] [1]
 (a) They are discarded (b) They are added as 0
 (c) They are included with NaN values (d) They cause an error
13. Which of the following terms refers to sending false emails to trick users into revealing confidential data?  [E] [1]
 (a) Phishing (b) Hacking (c) Cyberbullying (d) Spamming
14. Which keyword is used to display unique values from a column in an SQL table? [E] [1]
 (a) UNIQUE (b) DISTINCT (c) ONLY (d) PRIMARY
15. Which command selects only the column 'Marks' from DataFrame df?  [M] [1]
 (a) df.select('Marks') (b) df.loc[:, 'Marks'] (c) df.row('Marks') (d) df.get(Marks)
16. In which topology do the computers form a closed loop, and data travels in one direction? [E] [1]
 (a) Tree (b) Ring (c) Bus (d) Star
17. Which function is used to combine two strings in SQL?  [E] [1]
 (a) CONCAT() (b) ADD() (c) MERGE() (d) UNION()
18. Which function would you use to read a CSV file into a DataFrame? [H] [1]
 (a) pandas.read_table() (b) pandas.read_txt() (c) pandas.read_csv() (d) pandas.read()
19. What is the result of AVG() on a column that contains only NULL values? [E] [1]
 (a) 0 (b) NULL (c) Error (d) Infinity
20. Assertion (A): `df.iloc[1:3]` includes the rows at index positions 1 and 3.
 Reason (R): `iloc[]` includes the upper bound index in slicing. [E] [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.
21. Assertion (A): The ALTER command in SQL can be used to add or remove columns in an existing table.
 Reason (R): ALTER is a DDL command that modifies the structure of the database schema. [E] [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.

SECTION-B

22. (a) Write a short note on the head() and tail() functions in Pandas. [M] [2]
 OR
 (b) Describe what you understand by the term "Python library." How do the following libraries support data handling and visualisation tasks?
 • Pandas
 • Matplotlib
23. What are open source software and proprietary software? Give one difference with examples.  [E] [2]
24. Consider the string: "Information Technology Department". Write SQL queries to:
 (i) Display the word "Technology" from the given string.
 (ii) Show the starting position of "Depart" in the string. [M] [2]
25. (a) Define the term "incognito mode" in web browsers. Mention one benefit of using it.  [M] [2]
 OR
 (b) What are pop-up blockers in web browsers? How do they enhance user safety?
26. What is a Foreign Key? How does it help in maintaining referential integrity? [H] [2]

27. Suggest two netiquettes while using social media. [E] [2]

28. (a) Rohit is writing a program to create a Series from a list of marks, but there are some errors in his code. Identify the mistakes and rewrite the corrected version.

```
import pandas as pd
marks = (90, 85, 88, 76)
s = pd.series(marks)
print[S]
```

 [M] [2]

OR

(b) Fill in the blanks in the following Python code so that it displays the desired output (ignore the dtype in the output).

Expected Output:

```
Tamil Nadu      Chennai
Uttar Pradesh   Lucknow
Manipur         Imphal
import _____ as pd
data = ['Chennai', '_____', 'Imphal']
indx = ['Tamil Nadu', 'Uttar Pradesh', 'Manipur']
s = pd.Series(_____, indx)
print(_____)
```

SECTION-C

29. Amit burns a pile of broken keyboards and damaged circuit boards in his backyard to make space.

Answer the following:

- What health hazard can this practice cause to humans or animals nearby?
- Suggest a safer way to handle such damaged electronic components.
- Explain how proper disposal of e-waste supports a sustainable future.

[M] [3]

30. (a) Develop a Python program using a list of dictionaries to represent a DataFrame of students and their grades.

	Name	Grade
0	Riya	A
1	Mohan	B
2	Sneha	A+
3	Rahul	C

[M] [3]

OR

(b) Create a Pandas Series using a dictionary to store 5 country names as key and their capitals as values.

31. (i) Design an SQL table named EMPLOYEES with these fields:

Column Name	Data Type	Constraint
EmpID	Integer	Primary Key
EmpName	Varchar(30)	
Department	Varchar(20)	
Salary	Float(8,2)	
DOJ	Date	

Insert the following data into the EMPLOYEES table:
(101, 'Ramesh Sharma', 'Finance', 55000.75, '2019-06-01')

[H] [3]

32. (a) Consider the given two tables:

Table: STUDENTS (STU_ID, STU_NAME, CITY)

Table: STUDENTS

STU_ID	STU_NAME	CITY
101	Aryan	Mumbai
102	Meera	Delhi

103	Raghav	Pune
104	Simran	Jaipur
105	Ayesha	Kolkata

Table: GRADES (STU_ID, SUBJECT, SCORE, GRADE)

STU_ID	SUBJECT	SCORE	GRADE
101	Math	85	A
102	Science	78	B
103	Math	92	A
104	English	67	C
105	Science	88	A

Write SQL queries for the following:

- Show subject-wise average score.
 - List all unique grades in descending order of score.
 - Display the student name with the subject they are studying.
- (b) Consider the following table PRODUCT, which stores details of items available in a store.

[M] [3]

Table: PRODUCT

ProductID	ProductName	Category	Price
P01	Pen	Stationery	10
P02	Notebook	Stationery	50
P03	Mouse	Electronics	500
P04	Keyboard	Electronics	700
P05	Bag	Accessories	800

Answer the following questions:

- Which attribute can be considered as the Primary Key? Give a reason.
- Write an SQL query to increase the price of all "Electronics" items by 10%.
- Write the output of the following SQL query:
SELECT Category, AVG(Price) FROM PRODUCT GROUP BY Category;


SECTION-D

33. Ravi wants to create a bar chart to represent the sales of 4 different fruits.

Fruit	Quantity
Apple	30
Banana	20
Orange	25
Mango	15
DOJ	Date

```
import _____ as plt # Statement-1
fruits = ['Apple', 'Banana', 'Orange', 'Mango']
quantities = [30, 20, 25, 15]
plt._____(quantities, labels=fruits) # Statement-2
plt.title('_____') # Statement-3
plt.______() # Statement-4
```

- Write the suitable code for the import statement in the blank space in the line marked as Statement-1.
- Refer to the graph shown above and fill in the blank in Statement-2 with suitable Python code.
- Fill in the blank in Statement-3 with the name of the function to set the label on the y-axis.
- Refer to the graph shown above and fill in the blank in Statement-4 with a suitable Chart Title.

 [E] [4]

34. (a) Riya, who works as a database designer, has developed a database for a school transport.

This database includes a table Bus whose column (attribute) names are mentioned below:

Rtno: Shows the unique code for the route.

AreaCovered: Area covered by each bus.

Capacity: No. of seats.

Noofstud: No. of students assigned.

Distance: Distance covered by Bus.

Transporter: Transporter name

Charges: Charges of transporter

SchoolBus

Rtno	AreaCovered	Capacity	Noofstud	Distance	Transporter	Charges
1	Vasant_kunj	100	120	10	Shivam Travels	1,00,000
2	Hauz Khas	80	80	10	Anand Travels	95,000
3	Pitampura	60	55	30	Anand Travels	60,000
4	Rohini	100	90	35	Shivam Travels	75,000
5	Yamuna Vihar	50	60	30	Anand Travels	55,000

- Write an SQL query to display the names of all transporters without duplication.
- Write an SQL query to show the total charges collected by each transporter.
- Write an SQL query to display the average distance covered by buses, transporter-wise.
- Write an SQL query to show the minimum number of students assigned, transporter-wise.

[H] [4]

OR

- (b) Satyam, a database analyst, has created the following table:

RegNo	SName	Stream	Optional	Marks
S1001	Akshat	Science	CS	99
S1002	Harshit	Commerce	IP	95
S1003	Devika	Humanities	IP	100
S1004	Manreen	Commerce	IP	98
S1005	Gaurave	Humanities	IP	82
S1006	Saurave	Science	CS	NULL
S1007	Bhaskar	Science	CS	95
S1007	Bhaskar	Science	CS	9

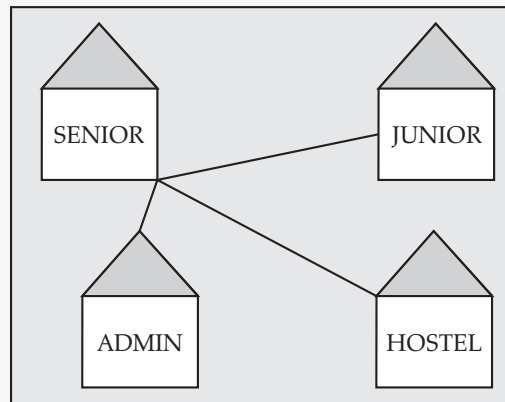
He has written the following queries:

- select sum(MARKS) from student where OPTIONAL= 'IP' and STREAM= 'Commerce';
- select max(MARKS)+min(MARKS) from student where OPTIONAL= 'CS';
- select avg(MARKS) from student where OPTIONAL= 'IP';
- select length(SNAME) from student where MARKS is NULL;

Help him in predicting the output of the above given queries.

SECTION-E

35. Multi-purpose Public School, Bengaluru, is setting up the network between its Different Wings of the school campus. There are 4 wings named as SENIOR(S), JUNIOR(J), ADMIN(A) and HOSTEL(H). Multi-purpose Public School, Bengaluru.



Wing A to Wing S	100 m
Wing A to Wing J	200 m
Wing A to Wing H	400 m
Wing S to Wing J	300 m
Wing S to Wing H	100 m
Wing J to Wing H	450 m

The number of computers installed at various wings is as follows:

Wings	Number of Computers
Wing A	20
Wing S	150
Wing J	50
Wing H	25

- Draw the cable layout to efficiently connect various wings of the multi-purpose Public School, Bengaluru.
- Name the most suitable wing where the Server should be installed. Justify your answer.
- Suggest a device/software and its placement that would provide data security for the entire school network.
- Suggest a device that shall be needed to provide wireless Internet access to all smartphone/laptop users in the campus of Multi-purpose Public School, Bengaluru.
- Suggest the placement of switch in the campus.

[M] [5]

36. Consider the following DataFrame students_df:

RollNo	Name	Class	Marks
0	Arjun	10	87
1	Meera	10	91
2	Kabir	10	78
3	Sara	10	84
4	Veer	10	88

Write Python commands to:

- Display the first 3 rows of students_df.
- Print all the names of the students.
- Delete the column Marks.
- Display the Name column for index 1 to 3.
- Change the column name Class to Standard.

[H] [5]

37. (a) Write suitable SQL queries for the following:

- To display the total number of pages from the pages column in the Books table.
- To extract the first five characters of the isbn_code column in the Books table.
- To remove any extra spaces from the author_name column in the Authors table.
- To find the highest price in the price column of the Books table.
- To count the total number of authors listed in the Authors table.

[M] [5]

OR

(b) Write the SQL statement for the following:

- (i) To calculate the average marks from the marks_obtained column in the Results table.
- (ii) To fetch the last two characters from the roll_no column in the Students table.
- (iii) To trim whitespace from the student_name column in the Students table.
- (iv) To find the maximum attendance value from the attendance column in the Attendance table.
- (v) To display the number of students enrolled in the Students table.

□□□

SOLVED

Sample Question Paper-5

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.

SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

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

Statement: The `rename()` function can be used to change the column names in a DataFrame. [E] [1]

2. What will be the result of the following SQL query?

`SELECT TRUNCATE(8.7654, 2);` [H] [1]
(a) 8.77 (b) 8.76 (c) 8.75 (d) 8.7

3. Which of the following is the most appropriate step to avoid being a victim of phishing? [M] [1]

(a) Avoid using antivirus (b) Do not open unknown email attachments.
(c) Do not use social media (d) Do not follow any blog

4. Which of the following methods is used to get the number of rows and columns in a DataFrame.  [M] [1]

(a) `df.shape()` (b) `df.len()` (c) `df.shape` (d) `df.size()`

5. Which device connects a Local Area Network (LAN) to the Internet? [E] [1]

(a) Repeater (b) Modem (c) Bridge (d) Router

6. Which of the following SQL expressions gives the remainder when 10 is divided by 3? [E] [1]

(a) `10 / 3` (b) `MOD(10, 3)` (c) `ROUND(10, 3)` (d) `CEIL(10, 3)`


7. Which type of Intellectual Property protects brand's unique identity, such as its logo, symbol, or brand name?

 [M] [1]

(a) Copyright (b) Patent (c) Prototype (d) Trademark

8. If you create a Series using `pd.Series([10, 20, 30])`, what will be the default index? [M] [1]




(a) 1, 2, 3 (b) 0, 1, 2 (c) 'a', 'b', 'c' (d) Random numbers

9. Which of the following is not true about a primary key?  [E] [1]

(a) It can have NULL values. (b) It must be unique.
(c) It can be a combination of multiple columns. (d) It is used to uniquely identify records.

- 10.** Which of the following protocols is primarily used for **sending emails**? [M] [1]
 (a) FTP (b) SMTP (c) VoIP (d) POP
- 11.** What will the SQL query `SELECT MIN(marks) FROM students;` return? [E] [1]
 (a) Minimum marks (b) Maximum marks (c) Average marks (d) Total marks
- 12.** Which function is used to **check missing (NaN) values** in a Pandas Series? [H] [1]
 (a) `isnull()` (b) `isempty()` (c) `isNaN()` (d) `nullcheck()`
- 13.** The Information Technology Act, 2000 in India mainly deals with:  [E] [1]
 (a) Regulating agricultural practices (b) Cyber crimes and electronic commerce
 (c) Protecting traditional knowledge (d) Copyright of literary works
- 14.** Which SQL clause is used **after GROUP BY** to filter aggregated data? [M] [1]
 (a) ORDER BY (b) HAVING (c) WHERE (d) LIMIT
- 15.** If a DataFrame `df` has 10 rows, what does `df.iloc[-1]` return?  [M] [1]
 (a) First row (b) Last row (c) Error (d) Second last row
- 16.** Which topology is most suitable for **small networks with minimal cable length** requirements? [M] [1]
 (a) Bus (b) Star (c) Mesh (d) Hybrid
- 17.** What does the `SUBSTR('DATABASE', 2, 4)` return? [H] [1]
 (a) REMOVE() (b) STRIP() (c) TRIM() (d) CUT()
- 18.** What does `df.columns` return in a DataFrame `df`? [E] [1]
 (a) Number of rows (b) List of column labels (c) Column values (d) Index names
- 19.** Which of the following aggregate functions can be used on a text column? [E] [1]
 (a) SUM() (b) COUNT() (c) AVG() (d) MOD()
- 20. Assertion (A):** The method `df.tail(3)` returns the first 3 rows of the DataFrame `df`.
Reason (R): `tail(n)` displays the last `n` rows from a DataFrame.  [E] [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.
- 21. Assertion (A):** In SQL, `NOT NULL` is used to allow null values in a column.
Reason (R): `NOT NULL` is a constraint used to ensure that a column must have a value.  [E] [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.

SECTION-B

- 22. (a) Differentiate between Series and DataFrame in Pandas.** Support your answer with appropriate examples.  [E] [2]
 OR
 (b) What do you mean by the term "open-source Python library"? Explain how the following libraries help in data analysis.
 • NumPy
 • Pandas
- 23.** Explain the role of Creative Commons licences. How do they benefit digital content creators? [H] [2]
- 24.** Use the string: "Machine Learning with SQL". Write SQL queries to:
 (i) Extract the substring "Learning" from the above string.
 (ii) Show the position of "SQL" in the string.  [M] [2]
- 25. (a)** Define a URL. How is it different from a domain name?  [M] [2]
 OR
 (b) What is a website? How is it different from a webpage? Give suitable examples.

26. What is a Composite Key? In what situations is it useful?

[H] [2]

27. What is e-waste? Suggest two proper ways to manage it.

 [M] [2]

28. (a) Ananya is trying to generate a bar graph using Matplotlib, but her code doesn't run as expected. Find and correct the mistakes.

```
import matplotlib.pyplot as plt
x = ['Jan', 'Feb', 'Mar']
y = [10, 15, 12]
plt.bargraph(x, y)
plt.label('Months')
plt.show[]
```

 [M] [2]

OR

(b) Complete the code to print a Series showing cities and their temperatures.

Expected Output:

Delhi 40

Mumbai 35

Kolkata 38

```
import _____ as pd
temps = [40, _____, 38]
cities = ['Delhi', 'Mumbai', 'Kolkata']
s = pd._____ (temps, index=_____)
print(s)
```

SECTION-C

29. Ravi decided to discard his old mobile phone by throwing it into the household trash bin.

Answer the following:

- What harmful consequence might this have on the environment?
- Recommend a safe method to dispose of old electronic devices like mobile phones.
- How can recycling electronic gadgets contribute to environmental protection?

 [M] [3]

30. (a) Create a Python program that constructs the following DataFrame using a list of dictionaries representing book records.

	Title	Author
0	Python 101	John
1	Data World	Aarti
2	AI Basics	Vikram
3	SQL Master	Neha

[M] [3]

OR

(b) Write a Python program to create a Pandas Series, where each index is a programming language and the corresponding value is its founder.

Python	Guido
Java	Gosling
C++	Bjarne

31. Write an SQL command to create a table called STUDENTS with the following structure:

 [E] [3]

Column Name	Data Type	Constraint
StudentID	Numeric	Primary Key
FirstName	Varchar(20)	
LastName	Varchar(10)	
DateOfBirth	Date	
Percentage	Float(10,2)	

Also, write an SQL query to insert the following record into the STUDENTS table:
(1, 'Supriya', 'Singh', '2010-08-18', 75.5)

34. (a) Consider the following tables: Library Management System

Table: BOOKS

BOOK_ID	TITLE	AUTHOR	PRICE
1	Python Programming	Dr. Sharma	450
2	Data Science Essentials	R. Verma	620
3	Web Development Guide	A. Khan	550
4	Machine Learning Basics	P. Iyer	700
5	Cyber Security Handbook	N. Mehta	500

Table: ISSUE

ISSUE_ID	BOOK_ID	STUDENT_NAME	ISSUE_DATE	RETURNED
201	1	Riya	2025-07-01	YES
202	3	Aman	2025-07-10	NO
203	2	Tia	2025-07-15	YES
204	4	Kabir	2025-07-18	NO
205	5	Naina	2025-07-20	YES

Write appropriate SQL queries for the following:

- Display the title and author of books priced above 500.
- List student names and book titles for books that have not been returned yet.
- Display all book titles along with their prices, sorted in descending order of price.



[H] [3]

OR

(b) Consider the following tables:

Table: CUSTOMERS

CUSTOMER_ID	CUSTOMER_NAME	CITY
1	Rahul	Surat
2	Meena	Delhi
3	Aditya	Mumbai
4	Nisha	Bangalore
5	Arjun	Jaipur

Table: ORDERS

ORDER_ID	CUSTOMER_ID	PRODUCT	QUANTITY	ORDER_DATE
101	1	Laptop	1	2025-07-05
102	2	Headphones	2	2025-07-06
103	3	Smartphone	1	2025-07-07
104	1	Keyboard	1	2025-07-08
105	4	Laptop	1	2025-07-09

Write appropriate SQL queries for the following:

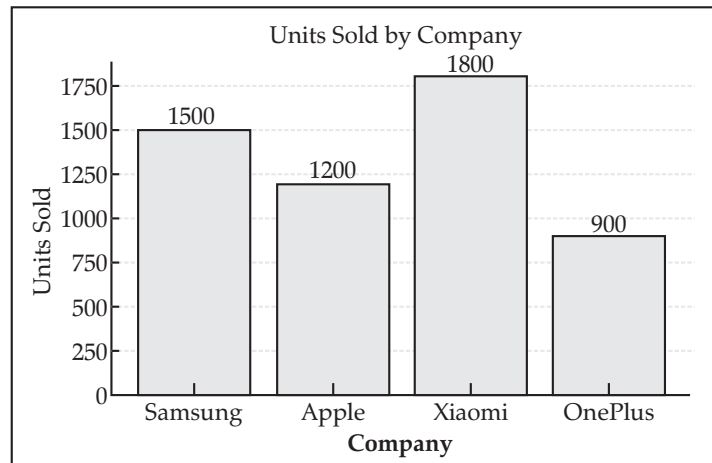
- Display all customer names who have placed more than one order.
- Show all orders placed by customers from Mumbai or Delhi.
- Count how many laptops were ordered.

SECTION-D

33. Shivani needs to complete a Python program that generates a bar chart showing mobile sales by 4 companies in the first quarter.

Company	Units Sold
Samsung	1500
Apple	1200
Xiaomi	1800
OnePlus	900

Help Shivani to complete the code.



Sub-Questions:

(i) Fill Statement-1 to import the required library.

(ii) Fill Statement-2 to plot sales.

(iii) Fill Statement-3 to label the Y-axis.

(iv) Fill Statement-4 with a proper chart title.

```
import _____ as plt # Statement-1
brands = ['Samsung', 'Apple', 'Xiaomi', 'OnePlus']
sales = [1500, 1200, 1800, 900]
plt.bar(brands, _____, color='green') # Statement-2
plt.xlabel('Company')
plt._____('Units Sold') # Statement-3
plt.title('_____') # Statement-4
plt.show()
```

[E] [4]

34. (a) Priya, a data analyst, maintains a table MOVIE for a streaming app. Table has following structure:

This database includes a table Bus whose column (attribute) names are mentioned below:

MCODE: Movie Code — A unique identifier for each movie (like a primary key). 4 M HEQ

TITLE: Movie Title — The name of the movie.

DIRECTOR: Director Name — Name of the person who directed the movie.

RATIN: Rating — Possibly a typo; should be RATING. It represents the average audience rating of the movie.

SchoolBus

MCODE	TITLE	DIRECTOR	RATING
M101	Inception	Christopher Nolan	8.8
M102	Dangal	Nitesh Tiwari	8.4
M103	Interstellar	Christopher Nolan	8.6
M104	The Lunchbox	Ritesh Batra	7.8
M105	Taare Zameen Par	Aamir Khan	8.5

- (i) Write an SQL query to display all movie titles in uppercase.
 (ii) Write an SQL query to display the maximum rating.

- (iii) 3. Write an SQL query to count the number of characters in each movie title.
 (iv) Write an SQL query to display MCODE and RATING sorted by RATING in ascending order.

[H] [4]

OR

- (b) Sameer created a table STUDENT for maintaining academic records with the following structure:

SID: Student ID – A **unique identifier** for each student.

NAME: Student Name – Full name of the student.

COURSE: Course Enrolled – The academic course or program the student is pursuing.

GRADE:- Final Grade – The overall academic performance of the student.

SID	NAME	COURSE	GRADE
S001	Anjali	BCA	A
S002	Raghav	BBA	B
S003	Neha	BCA	A+
S004	Sarthak	B.Com	B+
S005	Ayesha	BBA	A

- (i) Write an SQL query to display all student names in lowercase.
 (ii) Write an SQL query to find the total number of students in the BCA course.
 (iii) Write an SQL query to display the number of characters in each student's name.
 (iv) Write an SQL query to display the student ID and grade, sorted by grade in descending order.

SECTION-E

35. "Anutulya Creations"-A start-up fashion house has set up its main centre at Kanpur, Uttar Pradesh, for its dress designing, production and dress supplying activities. It has 4 blocks of buildings.

Distance between the various blocks is as follows:

A to D 50 m

A to P 60 m

A to S 110m

D to S 60m

P to S 50m

P to D 150m

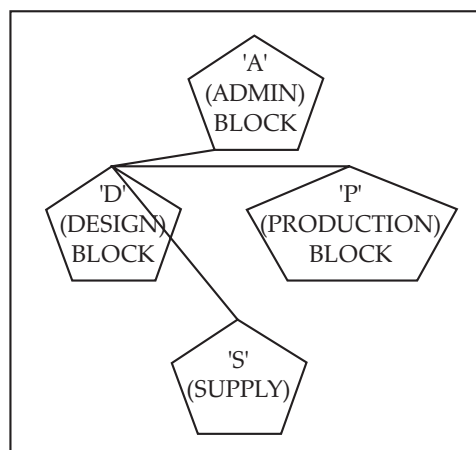
Numbers of computers in each block

Block A - 20

Block D - 80

Block P - 15

Block S - 8



Answer the following questions:

- (i) Out of LAN, WAN and MAN, what type of network will be formed if we interconnect different computers of the campus? Justify.
 (ii) Suggest the topology that should be used to efficiently connect various blocks of buildings within Kanpur centre for fast communication. Also, draw the cable layout for the same.

(iii) Suggest the placement of the following device with

Justification:

- (a) Repeater
- (b) Hub/Switch

(iv) Nowadays, video conferencing software is being used frequently by the company to discuss the product details with the clients. Name any one video conferencing software. Also mention the protocol which is used internally in video conferencing software.

(v) Suggest the placement of the Server.

[M] [5]

36. Consider the DataFrame df1 shown below.

Roll	Name	Class	Marks
101	Anaya	12	88
102	Rohan	11	76
103	Meena	12	92
104	Aarav	11	81
105	Sanya	12	85

Answer the following questions based on above dataframe:

- (i) Display the last three rows of the DataFrame df1.
- (ii) Show all the names of students.
- (iii) Drop the column Marks.
- (iv) Print names from index 1 to 3 (inclusive).
- (v) Rename the column Name to StudentName.

[H] [5]

37. (a) Consider the following table named Products, which stores details of items available in a store:

product_id	product_name	price	stock_quantity
101	Pen	10	200
102	Notebook	50	120
103	Pencil	5	500
104	Bag	800	50
105	Mouse	500	80

Answer the following questions based on the above table:

- (i) Write an SQL query to display the average value from the price column in the Products table.
- (ii) Write an SQL query to extract the first four characters of the product_name column.
- (iii) Write an SQL query to show the total number of products available in the Products table.
- (iv) Write an SQL query to find the highest stock quantity in the Products table.
- (v) Write an SQL query to convert the product_name to uppercase while displaying it.

[M] [5]

OR

(b) Consider the t table Customers with the given columns: customer_id, full_name, email, city

Answer the following questions based on table Customers:

- (i) Write an SQL query to display the number of characters in each value of the full_name column.
- (ii) Write an SQL query to convert the email column values to lowercase.
- (iii) Write an SQL query to count the number of distinct cities from the Customers table.
- (iv) Write an SQL query to remove extra spaces from the full_name column.
- (v) Write an SQL query to display customers in alphabetical order of their full_name.

□□□

SOLVED

Sample Question Paper-6

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.

SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

1. State Whether the given Statement is True or False.

Statement: A DataFrame can be created from a dictionary of lists using the `pd.DataFrame()` constructor. [E] [1]

2. What is the result of the following SQL query?

SELECT LCASE('CLASS 12 IP');

[E] [1]

- (a) CLASS 12 IP (b) class 12 ip (c) Class 12 Ip (d) error

3. Which of the following activities is considered **legal and ethical** use of the Internet?

 [E] [1]

- (a) Sharing pirated movies
(b) Accessing someone's email without permission
(c) Reporting cyberbullying on a school portal
(d) Downloading paid apps from third-party sites for free

4. Which function is used to **read data from an CSV file** into a Pandas DataFrame?

 [E] [1]

- (a) `read_csv ()` (b) `import_excel ()` (c) `load_excel ()` (d) `open_excel`

5. Which networking device is used for **converting digital data to analog** and vice versa, allowing Internet access over telephone lines? [M] [1]

- (a) Router (b) Modem (c) Gateway (d) Switch

6. What will `ROUND(13.75, 1)` return in SQL?

 [M] [1]

- (a) 13.7 (b) 13.8 (c) 13 (d) 14

7. A company has created an original advertisement jingle for its new beverage. Which type of Intellectual Property Rights (IPR) best protects this jingle? [M] [1]

- (a) Patent (b) Trademark (c) Copyright (d) Trade Secret





8. Which method of a Series returns the **first few elements**?

 [E] [1]

- (a) `top()` (b) `begin()` (c) `head()` (d) `first()`

9. How many primary keys can a single table have?


[M] [1]

- (a) One or more (b) Only one (c) Unlimited (d) None
- 10.** A student accesses her school computer from home over the Internet using a secure login. This is an example of: [E] [1]
(a) Remote Access (b) Cloud Backup (c) Email (d) Web Browsing
- 11.** What will SELECT COUNT(marks) FROM students; return if some students have NULL in marks?  [H] [1]
(a) Total number of students (b) Only students with non-NULL marks
(c) All rows including NULLs (d) Error
- 12.** In Pandas, what does the add() method do when working with two Series? [H] [1]
(a) Adds elements without considering indices (b) Adds only the common indices
(c) Aligns by index and fills unmatched values as NaN (d) Adds values with default index
- 13.** Which law in India provides legal recognition to electronic records and digital signatures? [E] [1]
(a) Digital Protection Act (b) Electronic Transaction Law
(c) Information Technology Act, 2000 (d) Cyber Law Enforcement Act
- 14.** If we want to sort a table by multiple columns, how should we use the ORDER BY clause? [H] [1]
(a) ORDER BY col1 OR col2 (b) ORDER BY col1, col2
(c) ORDER BY (col1 + col2) (d) GROUP BY col1, col2
- 15.** What is the result of df.loc[3:6] assuming integer index labels from 0 to 9?  [M] [1]
(a) Rows with indices 3 to 5 (b) Rows with indices 3 to 6
(c) Rows with indices 4 to 6 (d) Error
- 16.** Which topology is highly fault-tolerant due to multiple paths between nodes? [H] [1]
(a) Star (b) Mesh (c) Bus (d) Bus
- 17.** Which function will return the first three characters of the string 'PYTHON'?  [E] [1]
(a) LEFT('PYTHON', 3) (b) RIGHT('PYTHON', 3)
(c) SUBSTRING('PYTHON', 4, 3) (d) FIRST('PYTHON', 3)
- 18.** What does df.empty return when the DataFrame has no elements? [M] [1]
(a) 'Yes' (b) 0 (c) True (d) False
- 19.** Which SQL clause is commonly used with aggregate functions to group rows with the same values?  [E] [1]
(a) ORDER BY (b) GROUP BY (c) HAVING (d) WHERE
- 20. Assertion (A):** The drop() method can be used to remove rows or columns from a DataFrame.
Reason (R): To remove a row, the axis parameter in drop() must be set to 0. [M] [1]
(a) Both A and R are True, and R correctly explains A.
(b) Both A and R are True, but R does not correctly explain A.
(c) A is True, but R is False.
(d) A is False, but R is True.
- 21. Assertion (A):** The DELETE FROM table_name; command removes the entire table from the database.
Reason (R): DELETE is used to delete specific records from a table, not the table itself. [M] [1]
(a) Both A and R are True, and R correctly explains A.
(b) Both A and R are True, but R does not correctly explain A.
(c) A is True, but R is False.
(d) A is False, but R is True.

SECTION-B

- 22.** (a) Explain how indexing works in a Pandas Series. Demonstrate your explanation with an example showing custom index values. [M] [2]

OR

(b) How does Matplotlib help in data visualisation? Name one type of chart it can produce and describe a situation where it would be useful.
- 23.** What is the role of copyright in protecting digital content? Explain how it benefits both creators and users in the online environment. [M] [2]
- 24.** Given the string: 'Digital Communication Era' Write SQL queries to:
(i) Display the position of 'Comm' in the string.
(ii) Convert the entire string to lowercase.  [E] [2]

25. (a) Define a URL. What are its main components? Give an example to illustrate each part.

 [M] [2]

OR

- (b) What are third-party cookies? Why are they often blocked or restricted by modern web browsers?

26. What is the significance of using a Primary Key in a relational database table? How does it ensure data integrity?

 [E] [2]

27. Discuss the physical health problems that may arise due to poor posture while using computers or smartphones.

[M] [2]

28. (a) Sana attempts to create a DataFrame from a list of lists, but her program throws an error. Identify and correct the mistakes, highlighting them.

```
import panda as pd
records = [['Tom', 21], ['Jerry', 22], ['Spike', 20]]
df = pd.dataFrame(records, column = ['Name', 'Age'])
print(df)
```

[M] [2]

OR

- (b) Complete the code to display the first two rows of the DataFrame.

Output:

```
      Name  Age
0  Riya   19
1  Aman   21

import pandas as pd
data = {'Name': ['Riya', 'Aman', 'Sana'], 'Age': [19, 21, 22]}
df = pd.DataFrame(_____)
print(df._____(2))
```

SECTION-C

29. Neha bought a new smartphone and decided to throw her old phone in the household garbage bin. Her younger brother stopped her and explained why it's not a good idea.

- (i) Why should electronic items not be disposed of with regular household waste?
 (ii) Mention one harmful chemical commonly found in mobile phones.
 (iii) Suggest one digital platform or service where Neha can recycle or donate her old phone.

 [M] [3]

30. (a) Write a Python program to create the following DataFrame using a series:

Subject	Marks
English	90
Physics	75
Chemistry	80
Maths	95

 [M] [3]

OR


- (b) Write a Python Program to create a Pandas Series.. The index represents company names and the data represents their founders.

Microsoft	Bill Gates
Tesla	Elon Musk
Facebook	Mark Zuckerberg

31. (i) Create an SQL table named BOOKS with the structure below:

Column Name	Data Type	Key
ISBN	Varchar(13)	Primary Key
Title	Varchar(50)	
Author	Varchar(30)	
PublishedOn	Date	
Price	Float(8,2)	

- (ii) Write an SQL query to insert this book record: '9780132350884', 'Clean Code', 'Robert C. Martin', '2008-08-01', 499.99

 [E] [3]

32. (a) Consider the given tables:

Table: PRODUCT

PROD_ID	NAME	SUP_ID	PRICE
P101	MOUSE	S1	350
P102	KEYBOARD	S2	550
P103	MONITOR	S1	7500

Table: SUPPLIER

SUP_ID	SUPPLIER_NAME	CITY
S1	TECH WORLD	CHENNAI
S2	GADGET HUB	MUMBAI
P103	MONITOR	S1

Write SQL Queries for the following:

- Display product names along with supplier names.
- List all products priced above ₹500.
- Show the total price of products supplied by each supplier.

[M] [3]

OR

(b) Consider the given tables:

Table: STUDENTS

StudentID	Name	Grade
S001	Nisha	10
S002	Aryan	12
S003	Junaid	11
S004	Riya	10
S005	Karan	12

Table: ATTENDANCE

StudentID	Date	Status
S001	2025-07-20	Present
S002	2025-07-20	Absent
S003	2025-07-20	Present
S004	2025-07-20	Present
S005	2025-07-20	Absent

Write SQL queries for the following:

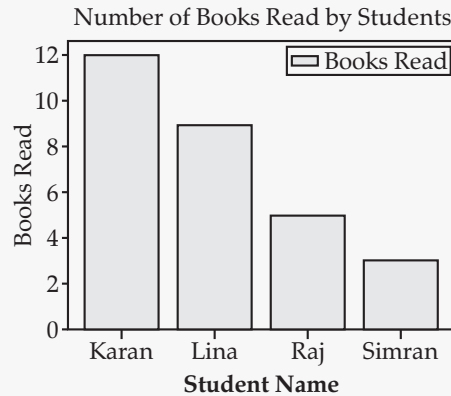
- Count how many students were present on 2025-07-20.
- Display the names of students who were absent.
- Show each student's name along with their attendance status.

SECTION-D

33. During a practical exam, a student Ankita, has to fill in the blanks in a Python program that generates a bar chart. This bar chart represents the number of books read by four students in one month.

Student name	Book Read	Status
Karan	12	Present
Lina	9	Absent
Raj	5	Present
Simran	3	Present
S005	2025-07-20	Absent

Help Ankita to complete the code



```
import _____ as plt                                #Statement-1
students = ['Karan', 'Lina', 'Raj', 'Simran']
books_read = [12, 9, 5, 3]
plt.bar(students, _____, label='Books Read')        #Statement-2
plt.xlabel('Student Name')
plt._____('Books Read')                                #Statement-3
plt.legend()
plt.title('_____')                                    #Statement-4
plt.show()
```

(i) Write the suitable code for the import statement in the blank space in the line marked as Statement-1.

(ii) Refer to the graph shown above and fill in the blank in Statement-2 with suitable Python code.

(iii) Fill in the blank in Statement-3 with the name of the function to set the label on the y-axis.

(iv) Refer to the graph shown above and fill in the blank in Statement-4 with suitable chart title.



34. (a) Preeti manages a database in a blockchain startup. For business purposes, she created a table named BLOCKCHAIN. Assist her by writing the following queries:

TABLE: BLOCKCHAIN

ID	User	Value	Hash	Transaction_Date
1.	Steve	900	ERTYU	2020-09-19
2.	Meesha	145	@345r	2021-03-23
3.	Nimisha	567	#wert5	2020-05-06
4.	Pihu	678	%rtyu	2022-07-13
5.	Kopal	768	rrt4%	2021-05-15
6.	Palakshi	534	wer@3	2022-11-29

(i) Write a query to display the year of the oldest transaction.

(ii) Write a query to display the month of the most recent transaction.

(iii) Write a query to display all the transactions done in the month of May.

(iv) Write a query to count the total number of transactions in the year 2022.

[H] [4]

OR

- (b) A cosmetic company has maintained a database for its company. The database includes a table name called Fashion which stores the details of the cosmetic products along with their price and quantity. The column (Attribute) of the Fashion table is mentioned below:

ID: Refers to the cosmetic product Id.

Product: Refers to cosmetic product name.

Price: Refers to the price of the product.

Qty: Indicates the number of products needed.

Table: Fashion

ID	Product	Price	Qty
F01	Kajal	970	10
F02	Foundation	2,100	15
F03	Night Cream	1,700	20

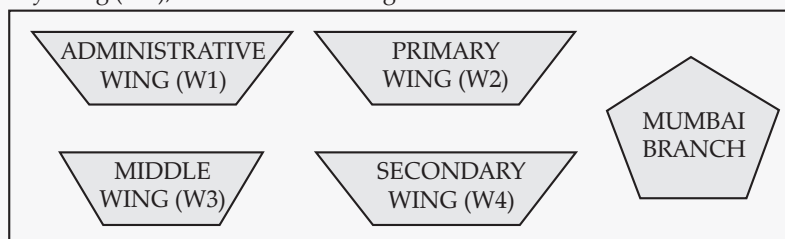
F04	Day Cream	1,400	10
F05	Shampoo	1,200	25
F06	Lipstick	850	32

Write the output of the following SQL Queries.

- SELECT COUNT (Product) FROM FASHION;
- SELECT SUM (Price*Qty) FROM FASHION WHERE Product = "Night Cream";
- SELECT LEFT (Product, 4) FROM FASHION WHERE Price > 1500;
- SELECT MAX (Price) FROM FASHION;

SECTION-E

35. ABC International school, Delhi, has different wings: Administrative Wing (W1), Primary Wing (W2), Middle Wing (W3) and Secondary Wing (W4), as shown in the diagram.



The school also has a branch in Mumbai. The school management wants to connect all the wings, as well as all the computers of each wing (W1, W2, W3, W4)

Distance between the wings is as follows:

- W3 to W1 85 m
- W1 to W2 40 m
- W2 to W4 25 m
- W4 to W3 120 m
- W3 to W2 150 m
- W1 to W4 170 m

Number of computers in each of the wing:

- W1 125
- W2 40
- W3 42
- W4 60

Based on the above specifications, answer the following questions:

- Suggest the topology and draw the most suitable cable layout for connecting all the wings of the Delhi branch.
- Suggest the kind of network required (out of LAN, MAN, WAN) for connecting.
 - Administrative Wing (W1) With Middle Wing (W3)
 - Administrative Wing (W1) With the Mumbai Branch.
- Suggest the placement of the following devices with justification:
 - Repeater
 - Switch/ Hub
- Due to the pandemic, schools have had to adopt online classes. Suggest the protocol that is used for sending the voice signals over Internet. Also, give an example of an application of WWW that helped the teachers to send messages instantly to the students.
- The company wants Internet accessibility in all the wings. Suggest a suitable technology.

 [M] [5]


36. Consider the DataFrame students shown below.

DataFrame: df_books

RollNo	Name	Class	Marks
101	Ankit	12	89
102	Riya	11	92
103	Aman	12	85
104	Sneha	11	95
105	Kunal	12	88

Write Python statements for the DataFrame students to:

- (i) Display only the names of all students
- (ii) Display the top 3 rows of the DataFrame
- (iii) Add a new row for student: 106, Neha, 11, 91
- (iv) Display data where class is 12
- (v) Drop the column Marks

 [H] [5]

- 37.** (a) (i) To extract the year part from the JoinDate column in the Employees table.
 (ii) To display the total quantity of all items from the Quantity column in the Inventory table.
 (iii) To convert the email values in the Users table to lowercase format.
 (iv) To find the number of products where Category is 'Electronics' in the Products table.
 (v) To calculate the average order value from the OrderAmount column in the Orders table where Status is 'Completed'.

 [M] [5]

OR

- (b) (i) Round the number 45.67891 to 1 decimal place.
 (ii) Find the square root of 144 using a SQL function.
 (iii) Display the position of the substring 'tech' in the string 'edutechplatform'.
 (iv) Extract the last 4 characters from the string 'SmartLearning'.
 (v) Show the data from the contact_number column in the Customers table after removing any leading or trailing spaces within the number (e.g., ' 1234567890 ' → '1234567890').

□□□

SOLVED

Sample Question Paper-7

Time Allowed: 3 hours




Maximum Marks: 80




General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.

SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

1. State Whether the given Statement is True or False.
Statement: The shape attribute of a DataFrame returns the total number of elements in the DataFrame. [E] [1]
2. Which SQL function is used to combine two strings together? [M] [1]
(a) JOIN() (b) MERGE() (c) CONCAT() (d) APPEND()
3. Which one of the following can help **prevent unauthorized access** to your personal data online? [E] [1]
(a) Using the same password for all websites
(b) Clicking on random links in emails
(c) Keeping software and antivirus up to date
(d) Ignoring software updates
4. Which method is used to **sort a DataFrame** by the values of a specific column?  [H] [1]
(a) df.order_by() (b) df.sort() (c) df.sort_values() (d) df.sort_column()
5. Which of the following devices can read **addresses** to forward data to the correct device?  [E] [1]
(a) RJ45 (b) Modem (c) Switch (d) Repeater
6. Which of the following SQL functions will **round a number to the nearest whole number**? [M] [1]
(a) FLOOR() (b) TRUNCATE() (c) ROUND(num, 0) (d) MOD()
7. Why is it important for authors and creators to register their copyright? [M] [1]
(a) To protect from hackers (b) To receive legal ownership and protection
(c) To improve marketing (d) To gain unlimited patents
8. Which of the following Series creation commands will result in a Series with custom labels 'x', 'y', 'z'?  [M] [1]
(a) pd.Series([1, 2, 3], index=['x', 'y', 'z'])
(b) pd.Series([1, 2, 3], labels=['x', 'y', 'z'])
(c) pd.Series([1, 2, 3], name=['x', 'y', 'z'])
(d) pd.Series([1, 2, 3], id=['x', 'y', 'z'])


- 9. Candidate key** can be defined as: [M] [1]
 (a) Key that consists of only one attribute
 (b) Set of attributes that can uniquely identify each record in a table.
 (c) Key used to connect two tables
 (d) Key that is always NULL
- 10.** Which of the following is an advantage of using VoIP?  [E] [1]
 (a) Requires landline (b) High international call charges
 (c) Voice communication over data networks (d) Only works with 4G SIM cards
- 11.** Which SQL function would you use to find the **average age** of employees from the employees table? [M] [1]
 (a) MEAN(age) (b) AVERAGE(age) (c) AVG(age) (d) TOTAL(age)
- 12.** If a Series A has index ['a', 'b', 'c'] and Series B has index ['b', 'c', 'd'], what will be the index of A + B?  [H] [1]
 (a) ['a', 'b', 'c'] (b) ['b', 'c'] (c) ['a', 'b', 'c', 'd'] (d) ['b']
- 13.** The primary purpose of the **IT Act, 2000** is to:  [E] [1]
 (a) Promote social networking
 (b) Control media content
 (c) Provide legal recognition to digital transactions and prevent cybercrime
 (d) Regulate television broadcasting
- 14.** Which SQL function is used to **count the total number of rows** in a result set? [E] [1]
 (a) COUNT() (b) SUM() (c) TOTAL() (d) NUMBER(*)
- 15.** What is the use of df.tail(2)? [E] [1]
 (a) It drops the last two rows (b) It returns the last two rows
 (c) It selects two random rows (d) It renames the last two rows
- 16.** Which topology is **cost-effective** and **easy to expand** in a growing network? [M] [1]
 (a) Ring (b) Tree (c) Mesh (d) Star
- 17.** Which function is used to extract **a portion of a string starting from a specific position**? [M] [1]
 (a) LENGTH() (b) SUBSTR() (c) TRIM() (d) INSTR()
- 18.** Which of the following is not a valid method to create a DataFrame? [M] [1]
 (a) From dictionary (b) From list of lists (c) From scalar value (d) From a tuple of integers
- 19.** Which of the following is used to calculate the average of numeric values in a column? [E] [1]
 (a) AVG() (b) MEAN() (c) TOTAL() (d) SUM()/COUNT()
- 20. Assertion (A):** The read_csv() function in Pandas is used to read data from a CSV file into a DataFrame.
Reason (R): The read_csv() function can only read files without headers and cannot handle delimiters other than commas. [M] [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.
- 21. Assertion (A):** The INSERT INTO command is a DML command.
Reason (R): DML commands are used to insert, update or delete the data stored in a database. [E] [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.

SECTION-B

- 22. (a)** What is the role of the dtype attribute in a Pandas Series? Explain its purpose and show how it helps in understanding the Series structure with an example. [M] [2]
 OR
 (b) Explain the term 'NumPy' in Python. Also, provide one use case where NumPy arrays are preferred over Python lists.
- 23.** How can plagiarism be avoided while using digital resources for academic or creative work? Mention any two tools or practices that support ethical content use. [M] [2]

24. Consider the string: 'Learning Structured Query Language' Write SQL queries to:

- Extract 'Query' from the string.
- Count the number of characters in the string, including middle spaces.

 [E] [2]

25. (a) Differentiate between a Website and a Web Page. Explain with one real-life example for each.

[M] [2]

OR

(b) What is the difference between Session Cookies and Persistent Cookies? Give an example of when each type might be used.

26. Suppose a table has multiple columns eligible to be a Primary Key. Explain how the database designer decides which one to choose, and what happens to the remaining keys.

[H] [2]

27. List two important tips for maintaining ergonomic safety while working on a computer for long hours.

 [M] [2]

28. (a) Manish wants to display specific columns from a DataFrame, but the output is incorrect. Fix the errors and underline the corrections.

```
import pandas as pd
data = {Name: ['Anita', 'Sunil'], 'Grade': ['A', 'B']}
df = pd.DataFrame(Data)
print(df['Marks'])
```

[M] [2]

OR

(b) Fill in the blanks to create a DataFrame with custom row indices.

Output:

	Marks
Ravi	85
Neha	92
Tina	88

```
import pandas as pd
data = [85, 92, 88]
students = ['Ravi', 'Neha', '_____']
df = pd.DataFrame(data, index=_____, columns=['Marks'])
print(df)
```

SECTION-C

29. A tech company disposes of outdated laptops by dumping them in a landfill near a riverbank. After a few months, nearby farmers complain of water contamination affecting their crops.

- Identify the link between e-waste and water pollution.
- Suggest an eco-friendly way the company could manage its outdated devices.
- Why should companies follow e-waste disposal laws strictly?

 [M] [3]

30. (a) Write a Python program to create the following DataFrame using a dictionary of lists:

City	Population
Mumbai	20400000
Kolkata	14800000
Bengaluru	12000000
Jaipur	4300000

 [M] [3]

OR

(b) Write a Python Program to create a Pandas Series. Use the country names as indices and their currencies as data.

Japan	Yen
USA	Dollar
India	Rupee

31. (i) Create an SQL table named COURSES as per the details:

Column Name	Data Type	Key
CourseID	Varchar(10)	Primary Key
Name	Varchar(40)	

Duration
Fee

Integer
Decimal(7,2)

- (ii) Insert the following record: C101, Data Analysis with Python, 6, 8500.50

 [E] [3]

32. (a) Consider the given tables:

Table 1: EMPLOYEE – stores EmployeeID, Name and Department.

EmployeeID	Name	Department
101	Aarav	HR
102	Meera	Finance
103	Karan	IT
104	Simran	Marketing
105	Raghav	IT

Table 2: SALARY – stores EmployeeID, Month and Amount.

EmployeeID	Month	Amount
101	January	50000
102	February	60000
103	January	75000
104	March	55000
106	February	80000

Write appropriate SQL queries for the following:

- List the names of employees from the IT department, sorted in ascending order.
- Display the month names in uppercase where employees earned more than 60,000.
- Display the names of employees along with the month and salary amount.

[M] [3]

OR

- (b) Consider the following table PRODUCT, which stores ProductID, ProductName, Category and Price.

Table: PRODUCT

ProductID	ProductName	Category	Price
201	Laptop	Electronics	55000
202	Chair	Furniture	3500
203	Mobile	Electronics	25000
204	Table	Furniture	4500
205	Headphones	Electronics	3000

- Which attribute in the table can be considered as the **Primary Key**? Provide justification for your answer.
- Write a suitable SQL query to add a new column **StockQuantity** of numeric data type to the table.
- Write the output of the following SQL query:

SELECT Category, COUNT(*) AS TotalProducts FROM PRODUCT GROUP BY Category;

SECTION-D

33. A teacher wants to create a Python program to display a bar chart of students' marks in three subjects. Some parts of the code are missing. Fill in the blanks to complete the program.

Student	Math	Science	English
Amit	85	78	88
Neha	90	85	92
Rahul	76	80	85

```

_____ as plt      # Statement-1
students = ['Amit', 'Neha', 'Rahul']
marks = [85, 90, 76]
_____              # Statement-2

```


```
plt.xlabel('Students')
plt.ylabel('Marks')
_____ # Statement-3
_____ # Statement-4
plt.show()
```

Fill Statement-1 with the appropriate Python import statement for plotting graphs.

Fill Statement-2 with the code to plot a **bar chart** with the given data and a label for the legend.

Fill Statement-3 with code to set the **title** of the chart to "Math Marks of Students".

Fill Statement-4 with code to **save the figure** as "math_marks.png".

 [E] [4]

34. (a) Employee Table

Riya, an HR manager, has created a table Employee as shown below:

EmpID	Name	Department	Salary	Joining_Date
201	Ankit Mehta	HR	50000	2020-01-10
202	Neha Sharma	IT	65000	2019-05-22
203	Rahul Verma	Finance	60000	2021-03-15
204	Priya Gupta	IT	70000	2020-08-30
205	Kunal Kapoor	HR	55000	2018-11-12

Write suitable SQL queries for the following:

- Display the **Name** and **Department** in lowercase, sorted in descending order of salary.
- Display the **EmpID** and the **year** in which the employee joined.
- Calculate and display the **highest salary** from the table.
- Show each **department** and the **number of employees** in that department.

[H] [4]

OR

(b) Library Table

The school librarian maintains a table Books as follows:

BookID	Title	Author	Price	Purchase_Date
301	Python Programming	Sumit Arora	550	2021-04-18
302	Data Science Essentials	Neha Singh	750	2020-06-25
303	SQL Made Easy	Rohit Kumar	600	2022-01-12
304	Web Development Basics	Anjali Mehta	500	2019-07-19
305	Artificial Intelligence	Varun Gupta	900	2021-11-03

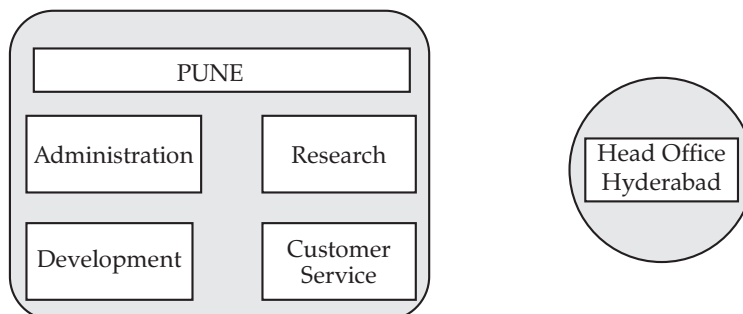
Write suitable SQL queries for the following:

- Show the **Title** and **Author** in uppercase, sorted alphabetically by Author name.
- Display the **BookID** along with the month name of purchase.
- Find and display the **average price** of all books.
- Show each **Author** and the **total number of books** written by them in the table.

SECTION-E

35. XYZ Solutions Ltd., a leading software development company, plans to set up its Head Office in Hyderabad and a regional branch in Pune.

The Hyderabad head office will consist of four departments: Administration, Research, Development and Customer Service.



Computer in Each Department

Administration: 150


Research: 220

Development: 100

Customer Service : 15

As the network engineer, you are required to propose solutions for the following queries:

- (i) Suggest the most suitable department in the Hyderabad office to install the main server, along with a reason for your choice.
- (ii) Draw a suitable cable layout for wired network connectivity between the departments in the Hyderabad office.
- (iii) Recommend the most appropriate networking device to connect all computers within each department.
- (iv) Suggest the type of network (LAN, MAN, or WAN) that should be used to connect the Hyderabad Head Office with the Pune Regional Branch.
- (v) During data transmission from the Administration department to the Customer Service department, the signal strength drops. Which device would you recommend to resolve this issue, and why?

 [M] [5]

36. Consider the DataFrame df shown below:

Name	Department	Age
Aarav Mehta	IT	29
Priya Sharma	HR	32
Kabir Khanna	Finance	41
Nisha Verma	Sales	35
Manav Kapoor	Marketing	28

Write Python statements for the following tasks:

- (i) Display the first two rows of the DataFrame.
- (ii) Add a new column named "Salary" with values [75000, 68000, 82000, 70000, 65000].
- (iii) Delete the column "Age" from the DataFrame.
- (iv) Rename the column "Department" to "Dept".
- (v) Display only the "Name" and "Dept" columns from the DataFrame.

 [H] [5]

37. (a) Write suitable SQL queries for the following:

- (i) To display the last three characters from the emp_code column in the Employees table.
- (ii) To display the total salary paid from the salary column in the Payroll table.
- (iii) To display the month name of the joining dates from the join_date column in the Employees table.
- (iv) To display the email column from the Clients table after converting all values to lowercase.
- (v) To display the current date and time.

[M] [5]

OR

(b) Write suitable SQL queries for the following:

- (i) To display the total number of characters in the string 'InformaticsPractice'.
- (ii) Find the position of the first occurrence of the letter 'e' in the Emp_Name column of the Employees table.
- (iii) Calculate the cube of the Price for each record in the Product_Price column of the Products table.
- (iv) To display the maximum marks from the Marks column in the Students table.
- (v) Display the total sum of the Quantity from the Quantity column in the Orders table.

□□□

SOLVED

Sample Question Paper-8

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.

SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

1. State whether the following statement is True or False:
The head() method returns the first n rows of a Pandas DataFrame. [1]
2. What will be the result of the following SQL query? SELECT MOD(14, 5); [1]
(a) 2 (b) 4 (c) 5 (d) 1
3. Ramesh received a message claiming he had won a lottery and was asked to share his bank details. What type of cybercrime is this? [1]
(a) Cyber bullying (b) Phishing (c) Identity theft (d) Hacking
4. Which function reads a CSV file into a Pandas DataFrame? [1]
(a) pd.import_csv() (b) pd.read_csv() (c) df.from_csv() (d) pd.csv_read()
5. Which network device regenerates and forwards electrical signals between two network segments to extend the transmission distance? [1]
(a) Bridge (b) Repeater (c) Router (d) Hub
6. What is the purpose of ROUND(num, 2) in SQL, assuming num has a fractional part? [1]
(a) Rounds to two decimal places (b) Always rounds up
(c) Leaves the number unchanged (d) Always rounds down
7. Aarav has invented a new fuel-efficient engine design for cars. Which type of intellectual property right will help him protect his invention? [1]
(a) Patent (b) Copyright
(c) Trademark (d) Both Copyright & Trademark
8. A Pandas Series is a _____. [1]
(a) Two-dimensional labelled data (b) One-dimensional labelled array
(c) Three-dimensional array (d) Unordered collection
9. In the relation Employee(EmpID, SSN, Email, Phone, DeptID), EmpID is defined as the primary key and SSN and

- Email each have unique constraints. How many candidate keys exist in this relation? [1]
 (a) 1 (b) 2 (c) 3 (d) 4
10. Which of the following mobile services uses VoIP for voice communication? [1]
 (a) SMS Messaging (b) GPS Navigation (c) WhatsApp Voice Call (d) Mobile Banking
11. Which function counts only the non-NULL values in column_name? [1]
 (a) COUNT(*) (b) COUNT(column_name)
 (c) COUNT(DISTINCT column_name) (d) SUM(column_name)
12. When multiplying two Pandas Series that have different index labels, the outcome is _____. [1]
 (a) Raises a KeyError
 (b) Drops non-matching indices and multiplies elementwise
 (c) Returns a Series with the union of indices and NaN where labels don't match
 (d) Ignores indices and multiplies by position
13. The ____ (Amendment) Act, 2008 introduced new cyber-offences such as cyber terrorism and data protection. [1]
 (a) Information Technology Act, 2008 (b) Digital India (Amendment) Act, 2008
 (c) Information Technology (Amendment) Act, 2008 (d) Cyber Security Enhancement Act, 2008
14. Which clause is used to group rows that share the same values in one or more columns before applying aggregate functions? [1]
 (a) WHERE (b) GROUP BY (c) HAVING (d) ORDER BY
15. Which of the following commands selects the first three rows (labels 0, 1, 2) of a DataFrame df? [1]
 (a) df.loc[:3] (b) df.loc[:2] (c) df.loc[0:3] (d) df.iloc[1:3]
16. In which topology does each node connect to a single central device, and all data passes through that device? [1]
 (a) Bus (b) Star (c) Ring (d) Mesh
17. What is the purpose of the UPPER() (or UCASE()) function in SQL? [1]
 (a) Convert all characters in a string to lowercase (b) Convert all characters in a string to uppercase
 (c) Remove leading spaces from a string (d) Trim spaces from both ends of a string
18. Which of the following statements creates an empty Pandas DataFrame? [1]
 (a) pandas.DataFrame([[None]]) (b) pandas.DataFrame()
 (c) pandas.DataFrame([None]) (d) pandas.DataFrame.empty()
19. Which of the following is NOT an aggregate function? [1]
 (a) COUNT() (b) MAX() (c) SUBSTRING() (d) AVG()
20. Assertion (A): `df.head(0)` returns an empty DataFrame but retains all column names. [1]
 Reason (R): `head(0)` returns zero rows and preserves the structure of the DataFrame, including its columns. [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.
21. Assertion (A): The ALTER TABLE command cannot change an existing column's data type. [1]
 Reason (R): ALTER TABLE supports modifying column definitions, including changing data types in most SQL dialects. [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.

SECTION-B

22. (a) What is a DataFrame in Pandas? Mention any one property/attribute of a DataFrame. [2]
 OR
 (b) Write two differences between a Series and a DataFrame in Pandas?
23. What is e-waste? Mention any one impact of e-waste on soil. [2]
24. Mohan wants to create a Pandas Series as shown below:
- | | |
|--------|-----|
| Apple | 3.0 |
| Banana | 1.2 |
| Cherry | 5.0 |

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

Note: ser_data is a dictionary.

```
import ____ as pd
```

```
ser_data = ____
```

```
prices = pd.__(ser_data)
```

```
print (prices)
```

[2]

25. (a) Explain to Rohan the role of a web server and web hosting in ensuring the availability of his website on the Internet. [2]

OR

(b) How would you define Voice over Internet Protocol and state one advantage of using it?

26. Write SQL queries to perform the following:

- (i) Display the name of the day (e.g., Monday, Tuesday) for the date '2026-07-04'.
 (ii) Return the length (number of characters) of the string "Incredible India".

[2]

27. What is copyright, and how does it differ from a patent?

[2]

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

```
import pandas as pd
```

```
fruits = pd.Series(['Apple', 'Banana', 'Cherry'])
```

```
prices = pd.Series([3.5, 1.2, 5.0])
```

```
df = pd.DataFrame({'Fruit': fruits, 'Price': prices})
```

```
df.rename(columns={'Fruit': 'Item', 'Price': 'Cost'}, inplace=True)
```

```
print(df)
```

[2]

OR

- (b) Write the output of the following code:

```
import pandas as pd
```

```
countries = pd.Series(['USA', 'Canada', 'Mexico'])
```

```
capitals = pd.Series(['Washington', 'Ottawa', 'Mexico City'])
```

```
df = pd.DataFrame({'Country': countries, 'Capital': capitals})
```

```
df = df.loc[df.index != 1]
```

```
print(df)
```

SECTION-C

29. Sunita has recently invented a new type of solar-powered water purification system and is concerned about the possibility of someone illegally copying and selling her invention without her permission.

- (i) What is Intellectual Property versus Intellectual Property Rights?
 (ii) Which IPR category applies to her purifier?
 (iii) Why is enforcing IPR crucial for inventors?

[3]

30. (a) Write a Python program to create a Pandas Series as shown below using a ndarray, where the subject names are the indices and the corresponding marks are the values in the series:

Physics 75

Chemistry 82

Biology 79

Mathematics 88

[3]

OR

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

	Name	Age
0	Alice	30
1	Bob	25
2	Charlie	28

31. (i) Write an SQL statement to create a table named TEACHERS, with the following specifications:

Column Name	Data Type	Key
TeacherID	Integer	Primary Key
Name	Varchar(40)	
Subject	Varchar(30)	
JoinDate	Date	

- (ii) Write an SQL query to insert the following data into the TEACHERS table: 1001, 'Sandeep Roy', 'Mathematics', '2018-07-01'

[3]

32. (a) Consider the following tables:

Table 1: STUDENT, which stores StudentID, Name and Class.

StudentID	Name	Class
S001	Arjun	10
S002	Meera	9
S003	Kavya	10
S004	Rahul	9
S005	Siya	10

Table 2: MARKS, which stores StudentID, Subject and Score

StudentID	Subject	Score
S001	English	78
S002	Mathematics	82
S003	Biology	88
S004	Chemistry	74
S005	Physics	91

Write appropriate SQL queries for the following:

- (i) List the names of students enrolled in Class 9, sorted in descending order.
(ii) Display the name of all subjects in lowercase where students scored more than 75 marks.
(iii) Display the StudentID of students along with their subject and score.

[3]

OR

- (b) Consider the following table EMPLOYEE, which stores EmployeeID, Name, Department and Salary.

Table: EMPLOYEE

EmployeeID	Name	Department	Salary
E101	Anjali	Marketing	65000
E102	Rohit	IT	72000
E103	Suman	Finance	54000
E104	Neha	Marketing	60000
E105	Rohit	IT	72000

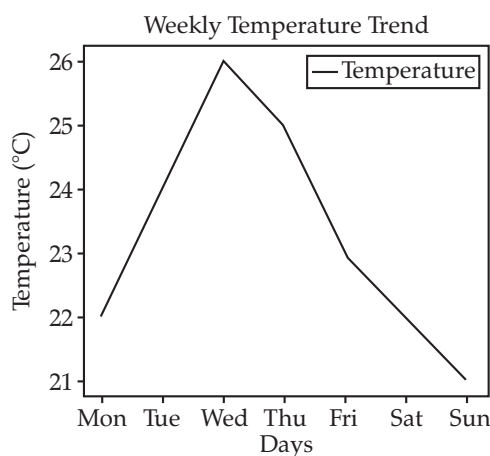
- (i) Which attribute in the table can be considered as the Primary Key? Provide justification for your answer
(ii) Write a suitable SQL query to add a new column, Experience, of numeric data type to the table.
(iii) Write the output of the following SQL query.

SELECT Department, COUNT(*) FROM Employee GROUP BY Department;

SECTION-D

33. Amit wants to visualise temperature trends over a week using a line graph.

Day	Temperature (°C)
Mon	22
Tue	24
Wed	26
Thu	25
Fri	23
Sat	22
Sun	21



Help Amit complete the code.

```

_____ as plt #Statement-1
Days = ['Mon', 'Tue', 'Wed', 'Thu', 'Fri', 'Sat', 'Sun']
Temperature = [22, 24, 26, 25, 23, 22, 21]
_____ #Statement-2
plt.xlabel('Days')
plt.ylabel('Temperature (°C)')
_____ #Statement-3
plt.legend()
_____ #Statement-4
plt.show()

```

- Write the suitable code for the import statement in the blank space in the line marked as Statement-1.
- Write the suitable code for the blank space in the line marked as Statement-2, which plots the line graph with the appropriate data and includes a label for the legend.
- Fill in the blank in Statement-3 with the correct Python code to set the title of the graph.
- Fill in the blank in Statement-4 with the appropriate Python code to save the graph as an image file named 'weekly_temperature.png'.

[4]

34. (a) Rajendra, who works as a database designer, has created a table named Employee as shown below:

Table: Employee

EmpID	Name	City	Salary	Join_Date
201	Neha Gupta	Delhi	55000	2021-01-10
202	Arjun Mehta	Mumbai	60000	2020-03-15
203	Riya Sharma	Kolkata	58000	2022-07-01
204	Kunal Joshi	Delhi	62000	2021-11-20
205	Meera Singh	Mumbai	57000	2020-06-05

Write suitable SQL query for the following.

- (i) Show the Name and City in uppercase, sorted by Name.
- (ii) Display EmpID and the month name of joining.
- (iii) Calculate average salary.
- (iv) Show cities and number of employees in each city.

[4]

OR

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

Table: Employee

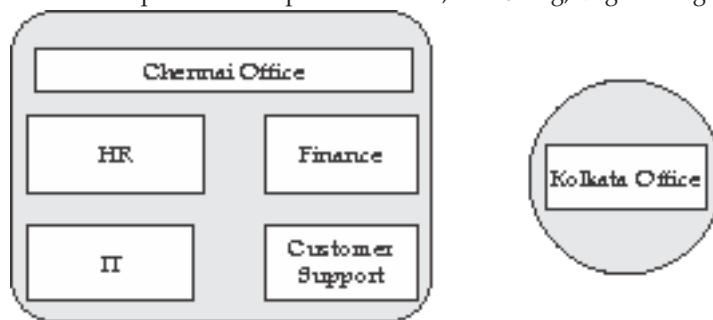
EmpID	Name	DOB	Salary	City
301	Raj	12-02-1990	60000	Delhi
302	Tanya	NULL	62000	NULL
303	Mohit	NULL	58000	Pune
304	Sneha	25-03-1992	61000	NULL

Write the output of the following SQL queries.

- (i) SELECT Name, LENGTH(Name) FROM Employee WHERE EmpID < 303;
- (ii) SELECT lower(Name) FROM Employee WHERE MONTH(DOB)=3;
- (iii) SELECT MAX(Salary) FROM Employee;
- (iv) SELECT Name, Salary FROM Employee WHERE Salary BETWEEN 60000 AND 65000;

SECTION-E

35. XYZ Solutions Ltd. is a prominent IT services firm with its headquarters in Bengaluru and a regional office in Kochi. The Bengaluru office comprises four departments: HR, Marketing, Engineering and Customer Service.



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

- HR to Marketing: 55 meters
- HR to Engineering: 85 metres
- HR to Customer Service: 110 metres
- Marketing to Engineering: 45 metres
- Marketing to Customer Service: 65 metres
- Engineering to Customer Service: 40 metres
- Bengaluru Office to Kochi Office: 1200 kilometres

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

- HR: 100
- Marketing: 35
- Engineering: 80
- Customer Service: 30
- Kochi Office: 60

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

- (i) Suggest the most suitable department in the Bengaluru Office setup to install the server. Also, give a reason to justify your suggested location.
- (ii) Draw a suitable cable layout of wired network connectivity between the departments in the Bengaluru Office.
- (iii) Which hardware device will you suggest to connect all the computers within each department?
- (iv) Suggest the most appropriate type of network (LAN, MAN, WAN) to connect the Bengaluru Head Office and Kochi Regional Office.
- (v) When a signal is transmitted through a wire from HR department to Customer Service department, its strength reduces. Which device would you suggest the company use to solve this problem?

[5]

36. Consider the DataFrame `df_students` shown below.

Index	Name	Major	GPA
0	Alice	Physics	3.8
1	Bob	Chemistry	3.2
2	Carol	Mathematics	3.9
3	David	Biology	3.5
4	Eve	Computer Science	3.7

Write Python statements for the following tasks:

- (i) Print the last three rows of `df_students`.
- (ii) Add a new column named `Credits` with values `[120, 110, 130, 100, 125]`.
- (iii) Delete the column `GPA` from the DataFrame.
- (iv) Rename the column `Major` to `Field`.
- (v) Display only the `Name` and `Credits` columns from the DataFrame.

[5]

37. (a) Write suitable SQL query for the following:

- (i) Extract the last four characters from the `employee_id` column in the `Employees` table.
- (ii) Count the number of customers from the `Customer_ID` column in the `Customers` table.
- (iii) Display the month from the `hire_date` column in the `Employees` table.
- (iv) Remove all leading and trailing spaces from the `City` column in the `Addresses` table.
- (v) Display the system date.

[5]

OR

(b) Write suitable SQL query for the following:

- (i) Find the length of the string 'InformationTechnology'.
- (ii) Find the position of the first occurrence of 'e' in the column `Course_Name` from the table `Courses`.
- (iii) Raise the value in the column `Score` to the power of 3 from the table `Results`.
- (iv) Find the maximum value in the column `Marks` from the table `Students`.
- (v) Find the minimum value in the column `Salary` from the table `Staff`.



SOLVED

Sample Question Paper-9

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.

SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

1. State whether the following statement is True or False:
The tail() method returns the first n rows of a Pandas DataFrame [1]
2. What will be the result of the following SQL query? SELECT MOD(6, 6); [1]
(a) 0 (b) 1 (c) 6 (d) NULL
3. A fake shopping website was created to steal users' credit card information. What is this an example of? [1]
(a) Phishing (b) Cyber bullying (c) Hacking (d) Identity theft
4. To save a DataFrame df to a CSV without writing row indices, which call is correct? [1]
(a) df.to_csv('file.csv', index=False) (b) df.to_csv('file.csv', no_index=True)
(c) df.to_csv('file.csv', row_index=False) (d) df.to_csv('file.csv', include_index=False)
5. Which device directs data packets between different networks based on their IP addresses? [1]
(a) Hub (b) Switch (c) Router (d) Modem
6. If you omit the second argument in ROUND(num), what precision does SQL use? [1]
(a) 0 decimal places (b) 1 decimal place
(c) Same number of decimals as num (d) Generates an error
7. Sona has written a bestselling fantasy novel. Which type of intellectual property right will help her protect her literary work? [1]
(a) Patent (b) Copyright
(c) Trademark (d) Both Copyright & Trademark
8. The default index used in a Pandas Series, if no index is explicitly specified, is _____. [1]
(a) Strings starting with 'a' (b) Consecutive integers starting from 1
(c) Random integers (d) Consecutive integers starting from 0
9. For a relation R(A, B, C, D, E), where A to E are columns and the relation contains 500 records, which of the following correctly states its degree and number of tuples? [1]

- (a) Degree = 5, Tuples = 500 (b) Degree = 500, Tuples = 5
(c) Degree = 5, Tuples = 5 (d) Degree = 500, Tuples = 500
- 10.** Which of these platforms relies on VoIP to carry voice traffic? [1]
(a) YouTube Video Streaming (b) Google Docs Collaboration
(c) Skype Voice Call (d) Reddit Discussion Boards
- 11.** Which aggregate returns the count of distinct non-NULL values in column_name? [1]
(a) COUNT(column_name) (b) COUNT(*)
(c) COUNT(DISTINCT column_name) (d) SUM(column_name)
- 12.** Dividing one Pandas Series by another when their indices differ produces _____. [1]
(a) A Series of zeros for unmatched labels (b) Only values for common indices, others dropped
(c) A union of both indices with NaN for missing entries (d) An exception due to misaligned indices
- 13.** Riya received an email that looked like it was from her bank, asking her to verify her account details by clicking a link. The email had the bank's logo, but the link directed her to a fake website. Later, she noticed unauthorized transactions from her account.
Which type of cybercrime has Riya most likely been a victim of? [1]
(a) Phishing and Identity Theft (b) Denial of Service Attack
(c) Spamming (d) Cyberstalking
- 14.** After using GROUP BY, which clause allows you to filter the aggregated groups based on a condition? [1]
(a) WHERE (b) GROUP BY (c) HAVING (d) ORDER BY
- 15.** To retrieve rows with labels 2 through 5 (inclusive), which command would you use? [1]
(a) df.loc[2:5] (b) df.loc[2:6] (c) df.iloc[2:5] (d) df.loc[3:5]
- 16.** Which topology uses a single continuous cable with terminators at each end, and every node taps into that cable? [1]
(a) Tree (b) Star (c) Bus (d) Hybrid
- 17.** What does the LOWER() (or LCASE()) function do? [1]
(a) Converts all characters in a string to uppercase (b) Returns the leftmost characters of a string
(c) Converts all characters in a string to lowercase (d) Removes trailing spaces from a string
- 18.** Which of the following creates a DataFrame from a Python dictionary of equal-length lists? [1]
(a) pandas.DataFrame.from_records({'x':[1,2], 'y':[3,4]}) (b) pandas.DataFrame({'x':[1,2], 'y':[3,4]})
(c) pandas.DataFrame(['x','y'], [[1,3],[2,4]]) (d) pandas.DataFrame.columns({'x':[1,2], 'y':[3,4]})
- 19.** Which of the following is NOT an aggregate function? [1]
(a) SUM() (b) LENGTH() (c) MAX() (d) AVG()
- 20. Assertion (A):** df.pop('col') retrieves the column 'col' and removes it from the DataFrame.
Reason (R): pop returns the popped column as a Series object. [1]
(a) Both A and R are True, and R correctly explains A.
(b) Both A and R are True, but R does not correctly explain A.
(c) A is True, but R is False.
(d) A is False, but R is True.
- 21. Assertion (A):** The DROP TABLE command removes both the table's definition and its data.
Reason (R): DROP TABLE is a DDL command; it removes the table structure but retains the data in a recycle bin. [1]
(a) Both A and R are True, and R correctly explains A.
(b) Both A and R are True, but R does not correctly explain A.
(c) A is True, but R is False.
(d) A is False, but R is True.

SECTION-B

- 22.** (a) What is a Series in Pandas? Mention any one property of a Series. [2]
OR
(b) List two distinctions in axis labels between a Pandas Series and a DataFrame.
- 23.** What is e-waste? Mention any one impact of e-waste on water bodies. [2]

24. Ravi wants to create a Pandas Series as shown below:

A	85
B	90
C	95

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

```
import ____ as pd
scores = [85, 90, 95]
labels = ____
s = pd.Series(scores, index=____)
print(s)
```

[2]

25. (a) Mohan has a domain name but doesn't know how DNS works. Explain the role of DNS in making his website reachable. [2]

OR

(b) What do you mean by Open Source Software? Give examples.

26. Write SQL queries to perform the following:

(i) Extract the year from the date '2025-12-25'.

(ii) Extract the substring "Credible" from "Incredible India" (starting at position 3, length 8).

[2]

27. What is meant by the term "Plagiarism" and how Plagiarism is differ from Copyright infringement? [2]

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

```
import pandas as pd
countries = pd.Series(['India', 'USA', 'Brazil'])
capitals = pd.Series(['New Delhi', 'Washington', 'Brasília'])
df = pd.DataFrame({'Country': countries, 'Capital': capitals})
df.rename(columns={'Country': 'CountryName', 'Capital': 'CapitalCity'},
inplace=True)
print(df)
```

[2]

OR

(b) Write the output of the following code:

```
import pandas as pd
fruits = pd.Series(['Apple', 'Banana', 'Cherry'])
colors = pd.Series(['Red', 'Yellow', 'Red'])
df = pd.DataFrame({'Fruit': fruits, 'Color': colors})
df = df.iloc[[0, 2]]print(df)
```

SECTION-C

29. Rohan has recently invented a new type of solar-powered air purification system and is concerned about the possibility of someone illegally copying and selling his invention without his permission.

(i) Define IP and IPR.

(ii) Specify the IPR protection for his device.

(iii) Outline the importance of IPR for innovators.

[3]

30. (a) Write a Python program to create a Pandas Series as shown below using a ndarray, where the subject names are the indices and the corresponding marks are the values in the series:

History	68
Geography	74
Economics	81
Sociology	77

[3]

OR

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

	Fruit	Price
0	Apple	3.5
1	Banana	1.2
2	Cherry	5.0

31. (i) Write an SQL statement to create a table named PROJECTS with the following specifications:

Column Name	Data Type	Key
ProjectID	Numeric	Primary Key
ProjectName	Varchar(50)	
StartDate	Date	
Budget	Float(6,2)	

- (ii) Write an SQL query to insert the following data into the PROJECTS table: 301, 'AI Development', '2023-01-15', 25.50

[3]

32. (a) Consider the following tables:

Table 1: STUDENT, which stores StudentID, Name and Class.

StudentID	Name	Class
ST1	Pinky	8
ST2	Aman	9
ST3	Jiya	8
ST4	Karan	9
ST5	Diya	8

Table 2: MARKS, which stores StudentID, Subject and Score

StudentID	Subject	Score
ST1	Mathematics	86
ST2	Science	79
ST3	History	92
ST4	Geography	67
ST5	Computer Sci.	88

Write appropriate SQL queries for the following:

- To count number of students in each class.
- Find the highest score and the corresponding subject.
- List students who scored below 70.

[3]

OR

- (b) Consider the following table EMPLOYEE, which stores EmployeeID, Name, Department and Salary.

Table: EMPLOYEE

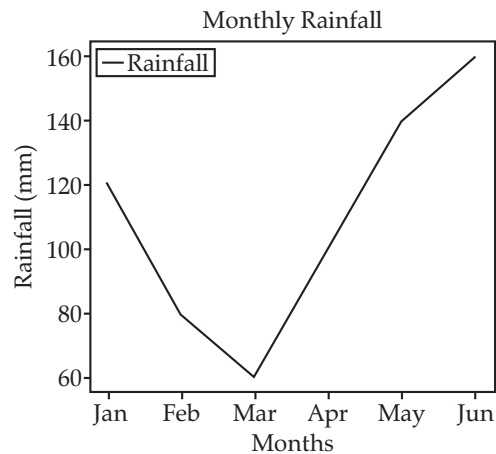
EmployeeID	Name	Department	Salary
E201	Vikash	HR	50000
E202	Tara	IT	80000
E203	Suresh	Operations	62000
E204	Ruchi	HR	55000
E205	Tara	IT	80000

- Which attribute in the Table can be considered as the Primary Key? Provide justification for your answer.
- Write a suitable SQL query to add a new column Experience of numeric data type to the table.
- Write the output of the following SQL query.
SELECT Department, COUNT(*) FROM Employee GROUP BY Department;

SECTION-D

33. Arjun is plotting a line graph of rainfall over six months.

Month	Rainfall (mm)
Jan	120
Feb	80
Mar	60
Apr	100
May	140
Jun	160



Help Amit complete the code.

```
as plt #Statement-1
Months = ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun']
Rainfall = [120, 80, 60, 100, 140, 160]
#Statement-2
plt.xlabel('Months')
plt.ylabel('Rainfall (mm)')
#Statement-3
plt.legend()
#Statement-4
plt.show()
```

- (i) Write the suitable code for the import statement in the blank space in the line marked as Statement-1.
- (ii) Write the suitable code for the blank space in the line marked as Statement-2, which plots the line graph with the appropriate data and includes a label for the legend
- (iii) Fill in the blank in Statement-3 with the correct Python code to set the title of the graph.
- (iv) Fill in the blank in Statement-4 with the appropriate Python code to save the graph as an image file named 'monthly_rainfall.png'. [4]

34. (a) Suken, who works as a database designer, has created a table Product as shown below:

Table: Employee

ProdID	Name	Category	Price	Launch_Date
101	Laptop	Electronic	55000	2021-05-10
102	Smartphone	Electronic	30000	2020-11-15
103	WashingMachine	Applications	25000	2022-01-20
104	Refrigerator	Applications	40000	2021-07-05
105	Headphones	Electronic	2000	2020-03-25

Write suitable SQL queries for the following:

- Display the Name and Category in uppercase, sorted by Price in descending order.
- Show ProdID and the year of the product launch.
- Calculate the total price of all products in the Electronics category.
- Show each category and the number of products in it.

[4]

OR

- (b) Consider the following table and write the output of the following SQL queries.

Table: Patient

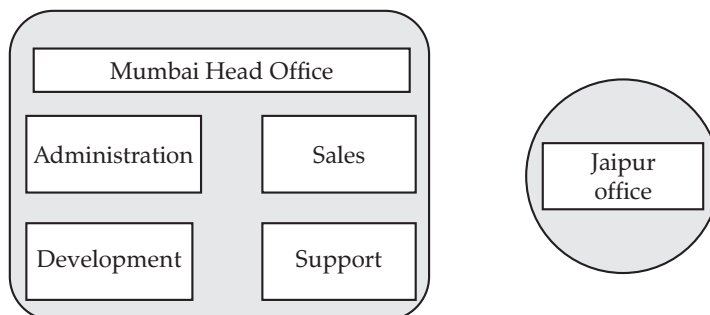
PatientID	Name	City	Age	Admit_Date
301	Ramesh Kumar	Delhi	45	2021-03-10
302	Priya Singh	Mumbai	30	2020-08-15
303	Anil Sharma	Kolkata	50	2022-02-01
304	Sneha Gupta	Delhi	35	2021-12-20
305	Karan Mehta	Mumbai	40	2020-05-05

Write the output of the following SQL queries.

- SELECT Name, LENGTH(Name) FROM Patient WHERE PatientID < 303;
- SELECT LOWER(Name) FROM Patient WHERE MONTH(Admit_Date) = 3;
- SELECT AVG(Age) AS Average_Age FROM Patient;
- SELECT Name, Age FROM Patient WHERE Age BETWEEN 30 AND 40;

SECTION-E

35. ABC Pvt Ltd is a leading global IT solutions provider. The company's head office is located in Mumbai and its regional office is in Jaipur. The Mumbai office comprises four departments: Administration, Sales, Development and Support.



From	To	Distance
Administration	Sales	60 meters
Administration	Development	90 meters
Administration	Support	1200 meters
Sales	Development	50 meters
Sales	Support	70 meters
Development	Support	45 meters

Mumbai ↔ Jaipur Link

- Distance: 1400 kilometres

Location	Number of Computer
Administration	120
Sales	40
Development	70
Support	25
Jaipur Regional Office	50

Answer the following questions as per the given data:

- (i) Suggest the most suitable department in the Mumbai office to install the central server. Give a reason to justify your suggested location.
- (ii) Draw a suitable cable layout diagram showing wired network connectivity between the four departments in Mumbai.
- (iii) Which network hardware device would you recommend to connect all the computers within each department?
- (iv) What type of network (LAN, MAN or WAN) would you use to connect the Mumbai head office and the Jaipur regional office?
- (v) When a signal is transmitted over the cable from the Administration department to the Support department, its strength degrades. Which device would you deploy to overcome this signal loss? [5]

36. Consider the DataFrame `df_cars` shown below:

Index	Make	Year	Price
0	Toyota	2020	20000
1	Honda	2018	18000
2	Ford	2019	22000
3	BMW	2021	35000
4	Audi	2017	30000

Write Python Statement for the following tasks:

- (i) print the last three of DataFrame.
- (ii) Add a new column named Credits with values [120, 110, 130, 100, 125].
- (iii) Delete the column Credits from the DataFrame.
- (iv) Rename the column Price to Rate.
- (v) Display only the Make and Year columns from the DataFrame. [5]

37. (a) Write suitable SQL query for the following:

- (i) Extract the first three characters from the `dept_code` column in the Departments table.
- (ii) Count the number of entries in the `Invoice_ID` column of the Invoices table.
- (iii) Display the day from the `payment_date` column in the Payments table.
- (iv) Trim spaces from the State column in the Locations table.
- (v) Display the current date and time. [5]

OR

(b) Write suitable SQL query for the following:

- (i) Count the characters in the string 'ComputerScience'.
- (ii) Find the position of 's' in the `Subject_Name` column of the Subjects table.
- (iii) Square the Fee column in the Courses table.
- (iv) Display the average age from the Age column in the Participants table.
- (v) Display the total fee from the Fee column in the Courses table.

SOLVED

Sample Question Paper-10

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

- (i) Please check 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 4 questions (29 to 32). Each question carries 3 Marks.
- (vii) Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- (viii) Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- (ix) All programming questions are to be answered using Python Language only.
- (x) In case of MCQ, text of the correct answer should also be written.

SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

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

The `reset_index()` method restores the default integer index after you've set a new index. [1]

2. What will be the result of the following SQL query? `SELECT MOD(3, 7);` [1]

- (a) 3 (b) 4 (c) 0 (d) 1

3. Rahul's social media account was accessed without permission and used to send inappropriate messages. What type of cybercrime occurred? [1]

- (a) Cyber bullying (b) Hacking (c) Phishing (d) Cyber Stalking

4. How do you read only the first 100 rows of a CSV file into a DataFrame? [1]

- (a) `pd.read_csv('file.csv', max_rows=100)` (b) `pd.read_csv('file.csv', nrows=100)`
(c) `pd.read_csv('file.csv', rows=100)` (d) `pd.read_csv('file.csv', head=100)`

5. Which hardware device connects multiple devices on the same network and filters data traffic by MAC address? [1]

- (a) Proxy (b) Switch (c) Firewall (d) Modem

6. In MySQL, what does `ROUND(123.456)` returns by default, when no precision is specified? [1]

- (a) 0 decimal places (b) 1 decimal place
(c) Same number of decimals as the input (d) Error

7. Dev created a distinctive logo for his new café chain. Which type of intellectual property right will help him protect that logo? [1]

- (a) Patent (b) Copyright
(c) Trademark (d) Both Copyright & Trademark

8. The attribute that returns the axis labels of a Series is _____. [1]

- (a) labels (b) index (c) axes (d) axis

9. Which of the following is an example of a composite primary key? [1]
 (a) SSN (b) PhoneNumber
 (c) FullName (stored as FirstName + LastName) (d) EmployeeID
10. Which of the following enterprise solutions is built around VoIP technology? [1]
 (a) Local File Server (b) On-premise Database
 (c) Unified Communications (Voice & Video) (d) Barcode Scanning System
11. Which function computes the sum of all non-NULL numeric values in column_name? [1]
 (a) AVG(column_name) (b) SUM(column_name)
 (c) COUNT(column_name) (d) TOTAL(column_name)
12. Which of the following can be used as the index of a Pandas Series? [1]
 (a) Only numbers (b) Only strings (c) Both numbers and labels (d) Only dates
13. The authority responsible for licensing and regulating Certifying Authorities under the IT Act is the Controller of _____.
 (a) Digital Signatures (b) Certifying Authorities (c) Electronic Transactions (d) Cyber Regulations
14. Which clause filters individual rows before any grouping or aggregation takes place? [1]
 (a) WHERE (b) HAVING (c) GROUP BY (d) ORDER BY
15. How do you select rows 1 to 4 (inclusive) and only the columns "A" and "C" from df? [1]
 (a) df.loc[1:4, ['A','C']] (b) df.loc[:, ['A','C']][1:4] (c) df.iloc[1:5, [0,2]] (d) df.at[1,['A','C']]
16. In which topology are nodes connected in a closed loop, with each node having exactly two neighbours? [1]
 (a) Ring (b) Mesh (c) Star (d) Bus
17. How does the SUBSTRING() (or MID()/SUBSTR()) function work? [1]
 (a) It finds the position of a substring within a string.
 (b) It returns a specified number of characters from within a string starting at a given position.
 (c) It measures the total length of a string.
 (d) It pads a string with spaces.
18. What will construct a DataFrame from a list of dictionaries? [1]
 (a) pandas.DataFrame.from_dict([{'a':1},{'a':2}]) (b) pandas.DataFrame.from_records([{'a':1},{'a':2}])
 (c) pandas.DataFrame({'a':[1,2]}) (d) pandas.Series([{'a':1},{'a':2}])
19. Which of the following is NOT an aggregate function? [1]
 (a) ROUND() (b) COUNT() (c) MIN() (d) AVG()
20. Assertion (A): df.T transposes the DataFrame converting rows to columns and vice versa.
 Reason (R): The T attribute rotates the DataFrame by 90 degrees clockwise. [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.
21. Assertion (A): The INSERT command is classified as DML.
 Reason (R): DML commands include operations that retrieve, insert, update or delete data in tables. [1]
 (a) Both A and R are True, and R correctly explains A.
 (b) Both A and R are True, but R does not correctly explain A.
 (c) A is True, but R is False.
 (d) A is False, but R is True.

SECTION-B

22. (a) What is an Index in Pandas? Mention any one characteristic of Index. [2]
 OR
 (b) Mention any two differences in how data types are managed in Series versus DataFrame.
23. What is e-waste? Mention any one impact of e-waste on air quality. [2]
24. Ravi wants to create a Pandas DataFrame as shown below:

	id	name
0	1	Alice
1	2	Bob

Help him complete the code below to achieve the desired output. import ____ as pd

```
data = {
    'id': ____,
    'name': ____
}

df = pd.__(data)

print(df)
```

[2]

25. (a) Rohan wonders how the URL he types in the browser actually connects to his hosted files. Explain the relation between URLs, IP addresses and web servers. [2]

OR

(b) What is web hosting? Give one example of a web hosting service.

26. Write SQL queries to perform the following:

- (i) Display the name of the day (e.g., Monday, Tuesday) for the date '2025-01-05'.
 (ii) Convert the string "incredible india" to uppercase. [2]

27. Define ethical hacking and explain how it differs from non-ethical hacking? [2]

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

```
import pandas as pd
emp_id = pd.Series([101, 102, 103])
salaries = pd.Series([50000, 60000, 55000])
df = pd.DataFrame({'ID': emp_id, 'Salary': salaries})
df.rename(columns={'ID': 'EmpID', 'Salary': 'Pay'}, inplace=True)
print(df)
```

[2]

OR

(b) Write the output of the following code:

```
import pandas as pd
languages = pd.Series(['Python', 'Java', 'C++'])
creators = pd.Series(['Guido van Rossum', 'James Gosling', 'Bjarne Stroustrup'])
df = pd.DataFrame({'Language': languages, 'Creator': creators})
df = df[df.index != 1]print(df)
```

SECTION-C

29. Worried about the theft of his solar-powered water decontamination machine, Rakesh inquires:

- (i) What are IP and IPR?
 (ii) Which IPR tool covers his machine?
 (iii) Why do inventors need strong IPR? [3]

30. (a) Write a Python program to create a Pandas Series as shown below using a ndarray, where the subject names are the indices and the corresponding marks are the values in the series:

English	92
Art	85
Music	89
Drama	90

[3]

OR

(b) Write a Python program to create a Pandas DataFrame displayed below using a dictionary of lists.

	Country	Capital
0	USA	Washington
1	Canada	Ottawa
2	Mexico	Mexico City

31. (i) I. Write an SQL statement to create a table named STUDENTS with the following specifications:

Column Name	Data Type	Key
StudentsID	Integer	Primary key
FullName	Varchar (40)	
DOB	Date	
Grade	Char (2)	

- (ii) Write an SQL query to insert the following data into the STUDENTS table: 501, 'Anjali Das', '2006-08-21', 'A+' [3]

32. (a) Consider the following tables:

Table 1: STUDENT, which stores StudentID, Name and Class.

StudentID	Name	Class
ST10	Rahul	11
ST11	Meera	12
ST12	Ishaan	11
ST13	Tanya	12
ST14	Priya	11

Table 2: MARKS, which stores StudentID, Subject and Score

StudentID	Subject	Score
ST10	Physics	79
ST11	Chemistry	84
ST12	Biology	91
ST13	Mathematics	75
ST14	English	89

Write appropriate SQL queries for the following:

- (i) Show classes with more than one student enrolled.
(ii) Show all subjects and scores where score is between 75 and 90.
(iii) Display student names, subjects, and scores sorted by score.

[3]

OR

- (b) Consider the following table EMPLOYEE, which stores EmployeeID, Name, Department and Salary.

Table: EMPLOYEE

EmployeeID	Name	Department	Salary
E301	Anjali	Finance	70000
E302	Ramesh	IT	65000
E303	Deepika	Marketing	60000
E304	Vikrant	Finance	72000
E305	Deepika	Marketing	60000

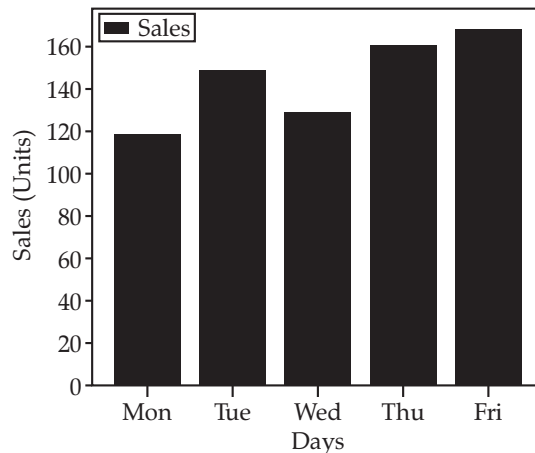
- (i) Which attribute in the Table can be considered as the Primary Key? Provide justification for your answer.
(ii) Write a suitable SQL query to add a new column, Experience, of numeric data type to the table.
(iii) Write the output of the following SQL query.
SELECT Department, COUNT(*) FROM Employee GROUP BY Department;

SECTION-D

33. Kavita is plotting a bar chart of daily sales.

Day	Sales (Units)
Mon	120

Tue	150
Wed	130
Thu	160
Fri	170



Help Kavita to complete the code.

```
as plt #Statement-1
Days = ['Mon', 'Tue', 'Wed', 'Thu', 'Fri']
Sales = [120, 150, 130, 160, 170]
#Statement-2
plt.xlabel('Days')
plt.ylabel('Sales (Units)')
#Statement-3
plt.legend()
#Statement-4
plt.show()
```

- Write the suitable code for the import statement in the blank space in the line marked as Statement-1.
- Write the suitable code for the blank space in the line marked as Statement-2, which plots the bar graph with the appropriate data and includes a label for the legend.
- Fill in the blank in Statement-3 with the correct Python code to set the title of the graph.
- Fill in the blank in Statement-4 with the appropriate Python code to save the graph as an image file named daily_sales.png

[4]

34. (a) Ritika, who works as a database designer, has created a table Book as shown below:

Table: Book

BookID	Title	Genre	Price	Publish_Date
201	Python Basics	Education	450	2021-06-15
202	The Silent Patient	Thriller	350	2020-09-10
203	Data Science 101	Education	600	2022-03-05
204	Midnight Library	Fiction	400	2021-11-25
205	Atomic Habits	Self-help	500	2020-01-20

Write suitable SQL queries for the following.

- Display the title and Genre in uppercase sorted by Price in descending order.
- Show BookID and the year of the book's publication.
- Calculated the total price of all books in the Education genre.
- Show each genre and the number of books in it.

[4]

OR

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

Table: Employee

EmpID	Name	Department	Age	Join_Date
401	Arjun Verma	HR	29	2021-04-10
402	Meera Joshi	IT	32	2020-03-15

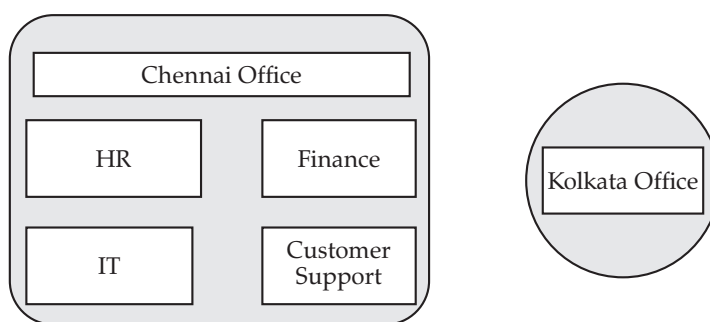
403	Rahul Singh	Finance	45	2022-06-01
404	Neha Kapoor	HR	38	2021-12-20
405	Aman Gupta	IT	41	2020-07-05

Write the output of the following SQL queries.

- (i) SELECT Name, SUBSTR(Name,5) FROM Employee WHERE EmpID < 403;
- (ii) SELECT LOWER(Name) FROM Employee
WHERE MONTH(Join_Date) = 3;
- (iii) SELECT AVG(Age) AS Average_Age FROM Employee;
- (iv) SELECT Name, Age FROM Employee WHERE Age BETWEEN 30 AND 40;

SECTION-E

35. DEF Corp. is a global IT and financial services provider. The company's head office is located in Chennai, while its regional office is in Kolkata. The Chennai office comprises four departments: HR, Finance, IT and Customer Support.



From	To	Distance
HR	Finance	50 meters
HR	IT	100 meters
HR	Customer Support	130 meters
Finance	IT	55 meters
Finance	Customer Support	75 meters
IT	Customer Support	40 meters

Chennai ↔ Kolkata Link

- Distance: 1500 kilometres

Location	Number of Computer
HR	90
Finance	45
IT	60
Customer Support	30
Kolkata Regional Office	40

Answer the following questions based on the above details:

- (i) Suggest the most suitable department in the Chennai office to install the central server. Give a reason to justify your suggested location.
- (ii) Draw a suitable cable-layout diagram showing wired network connectivity between the four departments in Chennai.
- (iii) Which network hardware device would you recommend to connect all the computers within each department?

- (iv) What type of network (LAN, MAN, or WAN) would you use to connect the Chennai head office and the Kolkata regional office?
- (v) When a signal is transmitted over the cable from HR to Customer Support, it attenuates. Which device would you deploy to overcome this signal loss? [5]

36. Consider the DataFrame shown below:

Index	Make	Year	Price
0	Toyota	2020	20000
1	Honda	2018	18000
2	Ford	2019	22000
3	BMW	2021	35000
4	Audi	2017	30000

Write Python Statement for the following tasks:

- (i) Print the last three rows of df_cars.
- (ii) Add a new column named Mileage with values [15, 18, 12, 10, 20].
- (iii) Delete the column Year from the DataFrame.
- (iv) Rename the column Price to Cost.
- (v) Display only the Make and Cost columns from the DataFrame. [5]

37. (a) Write suitable SQL queries for the following:

- (i) Extract the first six characters from the user_code column in the Users table.
- (ii) Count the number of transactions from the Trans_ID column in the Transactions table.
- (iii) Display the year from the signup_date column in the Users table.
- (iv) Remove leading and trailing spaces from the Street column in the Addresses table.
- (v) Display today's date. [5]

OR

(b) Write suitable SQL query for the following:

- (i) Count the characters in the string 'Artificial Intelligence'.
- (ii) Find the position of 'i' in the Topic column of the Seminars table.
- (iii) Square the Duration column in the Sessions table.
- (iv) Display the average rating from the Rating column in the Reviews table.
- (v) Display the total rating from the Rating column in the Reviews table.

Sample Question Paper-2

SECTION-A

1. True

Why? In Pandas, axis=0 means rows, axis=1 means columns. So drop(..., axis=1) removes columns.

Why not? False would imply axis=1 doesn't drop columns, but that's incorrect.

2. (b) 12.8

Why? ROUND(number, 1) keeps 1 decimal place. 12.789 → 12.8 because the next digit (9) rounds up.

Why not?

(a) (12.7): That's rounding down, which is incorrect here.

(c) (12.78): That's 2 decimal places, not 1.

(d) (13.0): That would require rounding to the nearest integer, not 1 decimal place.

3. (b) Hacking

Why? Hacking is unauthorized access to computer systems.

Why not?

(a) That's harassment online, not file access.

(c) That's copying someone's work.

(d) That's tricking people into giving personal info.

4. (c) `df.head()`

Why? `df.head()` shows first 5 rows if no number given.

Why not?

(a) Shows last 5 rows.

(b) Not a Pandas method (Spark DataFrames have it).

(d) Doesn't exist in Pandas.

5. (b) Router

Why? A router connects multiple networks and routes packets.

Why not?

(a) Connects devices in the same network.

(c) Basic broadcast device, no routing.

(d) Boosts signals, no routing.

6. (a) ROUND

Why? Rounds to nearest, not always down.

Why not?

(b) FLOOR(12.9) → 12.

(c) Returns next largest integer.

(d) Removes decimals without rounding, but behaviour can differ slightly across DBs.

7. (c) Trademark

Why? Trademarks protect brand identity like names, logos and symbols.

Why not?

(a) Protects inventions.

(b) Protects creative works like books/music.

(d) Protects industrial designs, not brand logos.

8. (d) All of the above

Why? Pandas Series can be made from lists, dicts, NumPy arrays, etc.

Why not? Because they're just subsets of possible options.

9. (c) Primary key

Why? A primary key is unique for each row.

Why not?

(a) Links to primary key in another table.

(b) Candidate key not chosen as primary.

(d) Primary key made of multiple columns (but here we just need "uniquely identifies" in general).

10. (c) Cloud Computing

Why? Cloud services allow storing/accessing data online.

Why not?

(a) Internet-based calling.

(b) Telecommunication method.

(d) Short-range wireless communication.

11. (b) SUM()

Why? SUM(column) returns total of numeric values.

Why not?

(a) Returns largest value.

(b) Counts rows.

(d) Not standard SQL.

12. (c) The scalar is added to all elements

Why? Pandas does element-wise operations automatically.

Why not?

(a) Not limited to first or last element.

(b) Not limited to first or last element.

(d) No error; it works fine.

13. (c) Physical assault
Why? IT Act covers cybercrimes, physical assault is not digital.
Why not? Data theft, cyberstalking, phishing are covered cybercrimes.
14. (d) Ascending
Why? ORDER BY column defaults to ASC.
Why not?
 (a) Needs DESC keyword.
 (b) Only if column is text and sorting ascending.
 (c) Needs an explicit randomization function.
15. (b) `df.iloc[]`
Why? `iloc[]` uses zero-based integer index positions.
Why not?
 (a) Uses labels, not positions.
 (c) Not for selecting rows directly.
 (d) Not a Pandas DataFrame method.
16. (b) Mesh
Why? Every device connected to every other requires most cables/interfaces.
Why not?
 (a) Fewer cables than mesh.
 (c) Single cable loop.
 (d) Single backbone cable.
17. (a) LOWER()
Why? LOWER('HELLO') → 'hello'.
Why not?
 (a) Not standard SQL.
 (b) Not standard SQL.
 (d) Not standard SQL.
18. (a) `df.head()`
Why? `head()` shows top 5 by default.
Why not?
 (b) Doesn't exist.
 (c) Not standard Pandas usage.
 (d) Not a Pandas method.
19. (b) Number of rows in the table
Why? Counts all rows, including those with NULLs.
Why not?
 (a) That's not what COUNT(*) does.
 (c) COUNT ignores nulls only if you count a specific column.
 (d) Primary keys aren't specifically counted here.
20. (d) (A is False, R is True)
Why? `head()` returns first 5 rows, not last.
Why not?
 (a) They assume A is true, but it's false.
 (b) They assume A is true, but it's false.
 (c) They assume A is true, but it's false.

21. (c) (A is True, R is False)
Why? You can use COUNT() etc., without GROUP BY (e.g., COUNT(*) on the full table).
Why not?
 (a) Because R is incorrect, so it can't be true for both.
 (b) Because R is incorrect, so it can't be true for both.
 (d) Because R is incorrect, so it can't be true for both.

SECTION-B

22. (a)

Series	DataFrame
A 1-dimensional labelled array.	A 2-dimensional labelled data structure (like a table.)
It contains only one column of data.	It can have multiple rows and columns.

Concept:

- Series is like a single with index and values.
- DataFrame is like an Excel sheet or SQL table with rows and columns.
- Pandas provides both as core data structures for data analysis.

22. (b) `import pandas as pd`

```
S_marks = pd.Series({'Raj':88, 'Simran':45, 'Ali':67, 'Maya':91})
```

- (i) Display marks of students who scored above 70:

```
print(S_marks[S_marks > 70])
```

- (ii) Set the Series name to "Exam Scores":

```
S_marks.name = "Exam Scores"
```

Concept:

- Boolean indexing is used to filter values.
- .Name is an attribute of Series to assign a title.

23. (i) Law violated:

Data Theft under the IT Act, 2000 (Sections 43 and 72)

- (ii) Two preventive measures:

1. Implement **Role-Based Access Control (RBAC)**—only authorised employees can access sensitive data.
2. Use **audit trails and monitoring systems** to detect and track data access activities.

24. (i) Display position of word 'IP':

```
SELECT INSTR('Class 12 IP Practical', 'IP');
```

- (ii) Count the total number of characters, including spaces:

```
SELECT LENGTH('Class 12 IP Practical');
```

25. (a)

Static Webpage	Dynamic Webpage
Content doesn't change unless edited manually.	Content changes based on user interactions or server-side logic.
Faster to load, HTML-only.	Requires scripting languages (PHP, JS, etc.)

(b)

WWW (World Wide Web)	Internet
A collection of web pages and multimedia linked via hyperlinks.	A global network that connects computers worldwide.
Uses HTTP protocol.	Uses multiple protocols like TCP/IP, FTP,
etc.	

26. Aggregate functions performs calculations on multiple rows of a table and return a single result.

Examples:

1. SUM()—Return total sum of a column.

2. AVG() – Returns average value of a column

27. **Plagiarism** is using someone else's work, words or ideas without giving credit, and presenting it as your own.

Example:

Copy-pasting a paragraph from a website into your school project without citation.

28. (a) `import pandas as pd` # 'Pandas' should be lowercase 'pandas'

`val = [10, 20, 30]`

`s = pd.Series(val, index = ['a', 'b', 'c'])` #missing comma between 'b' and 'c'

`print(s)` # 'S' should be lowercase 's'

(b) `import pandas as pd`

`data = [{'ITEM': 'Pen', 'PRICE': 10},`

`{ 'ITEM': 'Pencil', 'PRICE': 5},`

`{ 'ITEM': 'Eraser', 'PRICE': 7}]`

`df = pd.DataFrame(data)`

`print(df)`

SECTION-C

29. (i) Digital privacy refers to protecting personal data shared or stored online, including emails, passwords, browsing history and social media activity.

Importance:

- Prevents identity theft and misuse of data.

- Protects users from scams, fraud and unauthorised surveillance.

(ii) **Two precautions while sharing personal data online:**

1. **Avoid sharing sensitive information** (like phone numbers, addresses, bank details) on public forums or unknown websites.

2. **Use strong passwords** and enable **Two-Factor Authentication (2FA)** for accounts.

(iii)

- **Do not click on any links or download attachments.**

- **Report the email as phishing** to her email provider and delete it.

30. (a) `import pandas as pd`

`data = {'Fiction': 'F', 'NonFiction': 'NF', 'Drama': 'D', 'Poetry': 'P'}`

`s = pd.Series(data)`

`print(s)`

30. (b) `import pandas as pd`

`data = {'Brand': pd.Series(['Nike', 'Samsung', 'Dell', 'Titan']), 'Type': pd.Series(['Shoes', 'Phone', 'Laptop', 'Watch'])}`

`df = pd.DataFrame(data)`

31. (i) `CREATE TABLE Employee (EID INT PRIMARY KEY, EName VARCHAR(40), Department VARCHAR(30), Salary INT);`

Concept:

- CREATE TABLE defines schema.

- CREATE TABLE defines schema.

(ii) `SELECT EName, Salary FROM Employee WHERE Department = 'IT' ORDER BY Salary DESC;`

Concept:

- WHERE filters data.

- ORDER BY ... DESC sorts results from highest to lowest.

32. (i) **Display number of books written by each author:**

`SELECT AUTHOR_ID, COUNT(*) AS BookCount`

`FROM BOOKS`

`GROUP BY AUTHOR_ID;`

(ii) **Find average price of all books:**

`SELECT AVG(PRICE) AS AvgPrice`

`FROM BOOKS;`

(iii) **List titles of books and names of their authors:**

`SELECT B.TITLE, A.AUTHOR_NAME`

`FROM BOOKS B`

`JOIN AUTHORS A`

`ON B.AUTHOR_ID = A.AUTHOR_ID;`

SECTION-D

33. (i) `import matplotlib.pyplot as plt`
 (ii) `plt.plot(months, sales)`
 (iii) `plt.xlabel('Month')`
 (iv) `plt.title('Monthly Sales')`
34. (a) (i) `INSERT INTO PRODUCTS VALUES ('P106', 'Smart Watch', 'Electronics', 3500);`
 (ii) `SELECT * FROM PRODUCTS WHERE CATEGORY = 'Electronics';`
 (iii) `SELECT COUNT(*) FROM PRODUCTS WHERE CATEGORY = 'Footwear';`
 (iv) `SELECT UPPER(P_NAME) FROM PRODUCTS;`
34. (b) (i) RIA MEHRA
 (ii) RIA MEHRA, VIKAS SINGH
 (iii) ADITYA RAO, ALI KHAN
 (iv) 5

SECTION-E

35. (i) Firewall
 (ii) Star Topology
 (iii) Server should be in Admin block, which is centrally accessible and secure and has maximum number of systems.
 (iv) Use fibre optic cable, which is reliable and low maintenance.
 MAN connection – To connect within same city
 (v)

Device	Placement	Justification
Repeater	Admin to commerce	Distance is above 100 m. Boosts signals over distance to avoid data loss between buildings.
Hub/Switch	In each building (Preferably switch)	Switches reduce traffic by sending data only to the intended device, unlike Hubs, which broadcast to all.

Concept: Switch is preferred over a Hub for efficient data transmission and reduced traffic.

36. (i) `print(Student.head(3))`
 (ii) `print(Student['Name'])`
 (iii) `Student['Grade'] = 'A'`
 (iv) `print(Student.loc[[1, 4]])`
 (v) `Student.drop('Class', axis=1, inplace=True)`
Tips: Ensure axis=1 for columns; axis=0 is used for rows.
37. (a) (i) `SELECT AVG(SALARY) FROM EMPLOYEES;`
 (ii) `SELECT LEFT(EMP_NAME, 4) FROM EMPLOYEES;`
 (iii) `SELECT LOWER(EMP_NAME) FROM EMPLOYEES;`
 (iv) `SELECT MAX(SALARY) FROM EMPLOYEES;`
 (v) `UPDATE EMPLOYEES SET BONUS = BONUS + 500;`
- (b) (i) `SELECT POWER(8, 3);`
 (ii) `SELECT MONTH('2025-02-15');`
 (iii) `SELECT LENGTH('Digital Learning');`
 (iv) `SELECT YEAR('2023-12-10');`
 (v) `SELECT CURRENT_DATE();`

Sample Question Paper-3

SECTION-A

1. False

Why? `loc[]` can access both rows and columns using label-based indexing. Example: `df.loc[2, 'column_name']` accesses a specific cell.

Why not? The statement says "only rows" — that's incorrect because `loc` can handle both.

2. (a) 11

Why? 'Informatics' has 11 characters (I-n-f-o-r-m-a-t-i-c-s).

Why not?

(b) 10 → would mean miscounting letters.

(c) 9 → too short.

(d) 12 → too long.

3. (c) Intellectual Property Rights

Why? Distributing paid software without permission infringes the copyright and violates IPR.

Why not?

(a) Cyber Security Policy → relates to securing systems, not copyright theft.

(b) Data Protection → about safeguarding personal data, not piracy.

(d) Privacy Rights → about personal information, not software copying.

4. (b) `index=False`

Why? `df.to_csv('file.csv', index=False)` prevents index from being written.

Why not? b,c,d → Syntax error.

5. (c) Switch

Why? Switch works at Data Link layer (Layer 2) and forwards frames to the MAC address of the intended device.

Why not?

(a) Hub → broadcasts to all devices.

(b) Modem → works at Physical/Data Link for internet access, not switching.

(d) Repeater → regenerates signals.

6. (a) `ROUND()`

Why? `ROUND(7.8)` directly returns 8 by rounding off.

Why not?

(b) `FLOOR()` → returns 7.

(c) `POWER()` AND `MOD()` → modulus function, irrelevant.

7. (c) A poem written by a student

Why? Original literary works are copyright-protected.

Why not?

(a) Slogan → usually protected under trademark, not copyright.

(b) Algorithm → not copyrightable (can be patented).

(d) Company name → trademark.

8. (c) `series.index`

Why? `index` returns index labels.

Why not?

(a) `items()` → returns (index, value) pairs iterator.

(b) `labels` → no such attribute.

(d) `head()` → returns first few rows.

9. (b) Any attribute or combination that uniquely identifies a row

Why? Candidate key = any possible unique identifier (before primary key is chosen).

Why not?

(a) Only one column → not necessarily true.

(c) Only primary key → candidate keys are chosen before deciding PK.

(d) Only foreign key → FK is not unique.

10. (b) VoIP

Why? VoIP = Voice over Internet Protocol.

Why not?

(a) FTP → file transfer.

(c) SMTP → email sending.

(d) HTTP → web communication.

11. (c) Average of non-NULL salaries

Why? AVG ignores NULL values.

Why not?

(a) Max salary → use `MAX()`.

(b) Sum → use `SUM()`.

(d) Count → use `COUNT()`.

12. (c) `fillna()`

Why? `fillna(value)` replaces NaN with given value.

Why not?

(a) `fill_value()` → not a Series method.

(b) `replace()` → works but not specifically for NaN.

(d) `dropna()` → removes NaN values.

13. (b) Unauthorised access to someone's computer
Why? Unauthorised access is explicitly punishable under IT Act, 2000.

Why not?

- (a) Installing licensed software → legal.
 (c) Opening email account → legal.
 (d) Browsing educational sites → legal.

14. (c) ORDER BY column name DESC
Why? Standard SQL syntax.

Why not?

- (a) ORDER DESC → invalid.
 (b) SORT DOWN → invalid in SQL.
 (d) GROUP DESC → invalid.

15. (c) First 3 rows of df
Why? `iloc[:3]` selects rows at positions 0,1,2.

Why not?

- (a) Last 3 rows → need `iloc[-3:]`.
 (b) From index 3 to end → need `iloc[3:]`.
 (d) Only row with index 3 → `iloc[3]`.

16. (d) Star
Why? In Star topology, central hub failure disconnects all devices.

Why not?

- (a) Mesh → multiple connections, no single failure point.
 (b) Tree → has hierarchy but redundancy possible.
 (c) Ring → failure breaks loop, but not central node.

17. (c) TRIM()
Why? TRIM removes both leading and trailing spaces.

Why not? REMOVE(), STRIP(), CUT() → not standard SQL functions.

18. (b) `df.describe()`
Why? `describe()` gives mean, std, min, max, etc.

Why not?

- (c) `df.info()` → structure & data types.
 (d) `df.stats()`, `df.summary()` → not Pandas methods.

19. (c) MIN()
Why? MIN returns smallest value.
Why not?
 (a) LOW() → no such function.
 (b) SMALL() → in Excel, not SQL.
 (d) LEAST() → returns smallest among expressions, not column values.

20. (a) Both A and R are True, and R correctly explains A.

Why? Assertion: `df.loc[2]` accesses row with label 2 — True.

Reason: `loc` is label-based, `iloc` is integer-position based — True, and explains A.

21. (c) A is True, R is False

Why? Assertion: UPDATE modifies table structure — False (ALTER does that).

Reason: UPDATE is DML for updating records — True.

SECTION-B

22. (a) **Method 1:** From a List

```
import pandas as pd
data = [10, 20, 30]
s = pd.Series(data)
print(s)
```

Method 2: From a Dictionary

```
import pandas as pd
data = {'Maths': 90, 'Science': 85}
s = pd.Series(data)
print(s)
```

OR

(b)

Library	Use
Pandas	For data manipulation and analysis using DataFrames.
NumPy	For numerical computations and handling arrays.
Matplotlib	For data visualisation using graphs and charts.
Seaborn	For statistical data visualisation built on Matplotlib.

23. Plagiarism is the act of using someone else's work, ideas or content without giving proper credit, presenting it as your own.

To avoid plagiarism:

Always give credit to original authors using citations.

Use plagiarism detection tools.

Paraphrase and write in your own words.

Include references or bibliography.

24. (i) Extract 'Intel'

```
SELECT SUBSTRING('Artificial Intelligence', 12, 5);
```

- (ii) Convert to uppercase

```
SELECT UPPER('Artificial Intelligence');
```

25. (a) A web browser is a software application used to access and display content from the World Wide Web (e.g., Chrome, Firefox). A search engine,

on the other hand, is a website that helps users find web pages by indexing content across the internet (e.g., Google, Bing).

Browsers display the results; search engines provide links to relevant sites.

The two work together: users enter queries into search engines, which run inside browsers.

OR

- (b) A firewall is a security system—either hardware, software or both—that monitors and controls incoming and outgoing network traffic based on predetermined rules.

It acts as a barrier between trusted internal networks and untrusted external networks (like the internet).

Firewalls help prevent unauthorised access to or from private networks, making systems safer from malware or hacking attempts.

For example, corporate networks use firewalls to filter harmful web traffic.

26. A Foreign Key is a column in one table that refers to the Primary Key of another table. It is used to establish a relationship between two tables.

It helps maintain referential integrity by ensuring that the value in the foreign key column must exist in the referenced primary key column.

For example, in an Orders table, CustomerID can be a foreign key referencing the CustomerID in the Customers table.

If a customer is deleted, this constraint prevents orphan records in the Orders table.

27. Two good cyber hygiene practices are:

Use Strong and Unique Passwords: Use a mix of characters and avoid reusing passwords across platforms.

Regular Software Updates: Keep antivirus and OS updated to patch security vulnerabilities.

Practicing these ensures protection from malware, phishing attacks and unauthorised access to accounts.

25. (a) import pandas as pd

```
data = { 'Name': ['Amit', 'Riya', 'Kunal'], 'Age': [15, 14, 18]} # Error 1: unequal list lengths
df = pd.DataFrame(data) # Error 2: wrong function name (should be DataFrame with capital D)
print(df)
```

OR

- (b) s = pd.Series(data, index=cities)

SECTION-C

29. (i) Empathy and civic responsibility
(ii) Practical environmental education
(iii) NGOs like Saahas, Toxics Link or Ecoreco
30. (a) import pandas as pd

```
data = [
    {"City": "Delhi", "Population": 19800000},
    {"City": "Mumbai", "Population": 20400000},
    {"City": "Bangalore", "Population": 12300000},
    {"City": "Kolkata", "Population": 14600000}]
df = pd.DataFrame(data)
print(df)
```

OR

- (b) import pandas as pd

```
data = {
    "Apple": "Red",
    "Banana": "Yellow",
    "Kiwi": "Green"
}
s = pd.Series(data)
print(s)
```

31. CREATE TABLE COURSES (
CourseID INTEGER,
CourseName VARCHAR(40),
Duration INTEGER
);
ALTER TABLE COURSES ADD Fees FLOAT(8,2);
INSERT INTO COURSES VALUES (201, 'Python Programming', 60, 15000.00);
32. (i) SELECT Subject, AVG(Marks) AS Avg_Marks
FROM MARKS GROUP BY Subject;
(ii) SELECT S.Name, S.City FROM STUDENTS S
JOIN MARKS M ON S.RollNo = M.RollNo
WHERE M.Subject = 'IP' AND M.Marks > 85;
(iii) SELECT City, COUNT(*) AS No_of_Students
FROM STUDENTS GROUP BY City;

SECTION-D

33. Statement-1: matplotlib.pyplot
Statement-2: students, hours
Statement-3: xlabel
Statement-4: 'Study Hours per Week'
34. (a) (i) SELECT COUNT(*) FROM SCHOOLBUS
GROUP BY TRANSPORTER;
(ii) SELECT AVG(CHARGES) FROM
SCHOOLBUS WHERE CHARGES > 60000
GROUP BY TRANSPORTER;
(iii) SELECT SUM(NOOFSTUD) FROM
SCHOOLBUS GROUP BY TRANSPORTER;
(iv) SELECT MAX(CAPACITY) FROM
SCHOOLBUS GROUP BY TRANSPORTER;

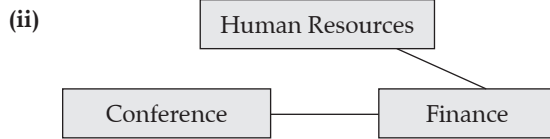
OR

(b) (i)	COUNT (Product)
	6

(ii)	SUM (Price * Qty)
	34,000
(iii)	LEFT (Product,4)
	FOUN
	NIGH
(iv)	MAX (PRICE)
	2,100

SECTION-E

35. (i) Finance block because it has the maximum number of computers.



- (iii) Satellite link
(iv) Switch
(v) LAN

36. (i) `print(df_books[df_books['Price'] > 300])`

- (ii) `df_books.drop('Author', axis=1, inplace=True)`
(iii) `print(df_books.head(3))`
(iv) `df_books.rename(columns={'Price': 'Cost'}, inplace=True)`
(v) `print(df_books['Title'])`

37. (a) (i) `SELECT RIGHT(Registration_Number, 3) FROM Vehicles;`
(ii) `SELECT UPPER(OwnerName) FROM Vehicles;`
(iii) `SELECT COUNT(*) FROM Vehicles;`
(iv) `SELECT LENGTH(Registration_Number) FROM Vehicles;`
(v) `SELECT TRIM(OwnerName) FROM Vehicles;`

OR

- (b) (i) `SELECT MAX(Salary) FROM Employees;`
(ii) `SELECT AVG(Salary) FROM Employees;`
(iii) `SELECT COUNT(*) FROM Employees WHERE Salary > 40000;`
(iv) `SELECT LOWER(Name) FROM Employees;`
(v) `SELECT COUNT(*) FROM Employees;`

□□□

Sample Question Paper-4

SECTION-A

1. True

Why? `iloc[]` stands for **integer-location based indexing**—it selects rows/columns by position (0-based index).

Why not? If it was false, that would mean `iloc[]` does not use integer indexing, which is not true.

2. (d) All of the above

Why? • `SYSDATE` (Oracle/MySQL), `CURDATE()` (MySQL), and `NOW()` (MySQL/PostgreSQL) can all return the current date.

3. (c) Cyber Bullying

Why? Cyberbullying = repeated online harassment, threats or insults.

Why not?

(a) Hacking = unauthorised access to systems.

(b) Phishing = tricking to steal credentials.

(d) Identity theft = stealing personal info to impersonate.

4. (b) `df.describe()`

Why? `describe()` gives count, mean, std, min, max and quartiles.

Why not?

(a) `stats()` and `summary()` don't exist in Pandas.

(c) `info()` gives column types and non-null counts, not statistics.

5. (b) Hub

Why? Hubs send incoming signals to all ports.

Why not?

(a) Switch sends only to the intended device.

(c) The router directs between networks.

(d) The modem connects to ISP.

6. (b) 2

Why? The remainder isn't 3, 1 or 4.

Why not? The remainder isn't 3, 1 or 4.

7. (b) A mathematical formula

Why? Abstract ideas, formulas and natural laws are not patentable.

Why not? Machines, apps with novel tech and drug formulas can be patented.

8. (c) Index can contain duplicate values

Why? Pandas allows duplicate index labels.

Why not?

(a) Labels don't have to be strings.

(b) Index can be changed with `.set_index()` or `.index =`

(d) Index doesn't always start from 1.

9. (c) Candidate keys

Why? Candidate keys are attributes that can uniquely identify a row.

Why not?

(a) Composite key = combination of attributes (not needed here individually).

(b) Foreign key = links to another table.

(d) Super key = candidate key + extra attributes.

10. (d) VLC Media Player

Why? VLC is a media player, not a cloud storage platform.

Why not? Google Drive, Dropbox, iCloud store files online.

11. (b) `MAX()`

Why? `MAX()` returns the largest value in a column.

Why not?

(a) `HIGH()` doesn't exist.

(c) `TOP()` limits rows in `SELECT`.

(d) `CEIL()` rounds numbers up.

12. (c) They are included with NaN values

Why? Pandas aligns by index; unmatched indices result in NaN.

Why not? They aren't discarded, added as 0 or cause errors.

13. (a) Phishing

Why? Phishing = fraudulent email to steal info.

Why not? Hacking = system breach; cyberbullying = harassment; spamming = mass unsolicited messages.

14. (b) `DISTINCT`

Why? Removes duplicate rows from query output.

Why not?

(a) `UNIQUE` is a constraint, not for query results.

(c) `ONLY` and `PRIMARY` don't do this.

15. (b) `df.loc[:, 'Marks']`

Why? `.loc[:, 'Marks']` selects all rows and only the "Marks" column.

Why not?

(a) `select()` not in Pandas.

(c) `.row()` doesn't exist.

(d) `.get()` is not used for columns like that.

16. (b) Ring
Why? Ring topology connects devices in a loop, and data flows one way.
Why not? Tree, Bus and Star are not loops.
17. (a) CONCAT()
Why? CONCAT() joins strings.
Why not? ADD() is for numbers, MERGE() is not SQL standard, UNION() merges result sets.
18. (c) `pandas.read_csv()`
Why? Reads CSV directly into DataFrame.
Why not? `read_table()` is for tab-delimited, `read_txt()` doesn't exist, `read()` isn't a Pandas function.
19. (b) NULL
Why? Aggregate functions ignore NULLs; if all are NULL, the result is NULL.
Why not? It doesn't default to 0, error or infinity.
20. (d) A is False, but R is True.
Why? `df.iloc[1:3]` includes rows at positions 1 and 2 (upper bound excluded), so A is false.
`iloc[]` does not include upper bound, so R is true.
21. (a) Both A and R are True, and R correctly explains A.
Why? ALTER can add/remove columns.
 ALTER is a DDL command that modifies the schema — this explains A.

SECTION-B

22. (a) In Pandas, the `head()` and `tail()` functions are used to view a small portion of a DataFrame or series:
- `head(n)` returns the first `n` rows. By default, it shows the top 5 rows.
 - `tail(n)` returns the last `n` rows. Default is also 5 rows.
- These functions help in quick inspection of large datasets for checking structure, column names and data format.
- Prep Tool:**
- **Concept Applied:** Data preview in Pandas
 - **Common Mistake:** Forgetting parentheses () or using `head[5]` instead of `head(5)`
 - **Answering Tip:** Always mention default value is 5 rows
 - **High-Value Point:** Helpful for data analysis and debugging
22. (b) A Python library is a collection of pre-written functions and modules that help in solving specific problems without writing code from scratch.
- **Pandas:** It supports data handling tasks like reading/writing data, cleaning and analysing datasets using DataFrame and Series structures.
 - **Matplotlib:** It is used for data visualisation tasks such as drawing bar charts, line graphs, pie charts, etc.

Prep Tool:

- **Concept Applied:** Python libraries in Data Analysis
- **Common Mistake:** Confusing Pandas with data visualisation
- **Answering Tip:** Use one-liners with keyword functions like DataFrame and plot()
- **High-Value Point:** Libraries save time and improve efficiency

23. • **Open-source software** is freely available, and its source code can be modified and distributed.

Example: LibreOffice, Python

- Proprietary software is owned by companies; the source code is not shared.

Example: MS Office, Windows OS

Difference: Open-source allows modification, proprietary software does not.

Prep Tool:

- **Concept Applied:** Types of software licensing
- **Common Mistake:** Using free = open source (not always true)
- **Answering Tip:** Always include an example for each
- **High-Value Point:** Licensing control is the key differentiator

24. (i) `SELECT SUBSTRING('Information Technology Department', 13, 10);`
 (ii) `SELECT INSTR('Information Technology Department', 'Depart');`

Prep Tool:

- **Concept Applied:** String functions in SQL – SUBSTRING() and INSTR()
- **Common Mistake:** Wrong position (index starts at 1 in SQL), incorrect length
- **Answering Tip:** Count character positions carefully
- **High-Value Point:** INSTR returns the first match position

25. (a) **Incognito mode** is a private browsing feature in web browsers that does not save your browsing history, cookies or form inputs.

Benefit: It helps maintain privacy on shared or public devices.

- (b) **Pop-up blockers** are browser tools that prevent unwanted pop-up windows from appearing.

They **enhance safety** by stopping malicious ads or phishing attempts from being triggered automatically.

Prep Tool:

- **Concept Applied:** Privacy & safety features in browsers
- **Common Mistake:** Confusing incognito with full anonymity (it doesn't hide from ISP)

- **Answering Tip:** Give practical benefit (e.g., avoid tracking)
- **High-Value Point:** Both features are used for privacy protection

26. A **Foreign Key** is a field in one table that refers to the *Primary Key* in another table.

It ensures **referential integrity** by maintaining valid relationships between tables. If a record is inserted with a non-existing reference, it will be rejected.

Prep Tool:

- **Concept Applied:** Database relationships
- **Common Mistake:** Confusing with Primary Key
- **Answering Tip:** Use terms like *reference*, *related table*
- **High-Value Point:** Maintains data accuracy and consistency

27. Two **netiquettes** while using social media are:

- (1) **Be respectful:** Do not post offensive, abusive, or hurtful comments.
- (2) **Protect privacy:** Do not share personal or confidential information of yourself or others publicly.

28. (a) import pandas as pd

```
marks = [90, 85, 88, 76] # Changed from tuple to list for clarity
```

```
s = pd.Series(marks) # 'Series' should be capitalized
```

```
print(s) # print() uses parentheses, not square brackets
```

(b) import pandas as pd

```
data = ['Chennai', 'Lucknow', 'Imphal']
```

```
indx = ['Tamil Nadu', 'Uttar Pradesh', 'Manipur']
```

```
s = pd.Series(data, indx)
```

```
print(s)
```

Prep Tool:

- **Concept Applied:** Creating Series with custom index
- **Common Mistake:** Lowercase 'series', square brackets in print
- **Answering Tip:** Use correct data structures (list or tuple)
- **High-Value Point:** Capitalisation and syntax matter in Pandas

SECTION-C

29. (i) Health Hazard:

Burning electronic waste releases toxic chemicals like lead, mercury and cadmium. These can cause respiratory issues, skin diseases and even cancer in humans and animals.

(ii) Safer Handling Suggestion:

E-waste should be handed over to authorised e-waste recyclers or collected at designated e-waste collection centres for proper recycling.

(iii) Sustainable Future:

Proper disposal of e-waste helps recover valuable materials (like copper and gold), **reduces environmental** pollution and promotes reuse and recycling, thus supporting a greener planet.

Prep Tool:

- **Concept Applied:** Cyber safety and environmental awareness
- **Common Mistake:** Confusing e-waste with general waste
- **Answering Tip:** Give health + environment + reuse angle
- **High-Value Point:** Mention "authorized recyclers" and "resource recovery"

30. (a) import pandas as pd

```
students = [
    {"Name": "Riya", "Grade": "A"},
    {"Name": "Mohan", "Grade": "B"},
    {"Name": "Sneha", "Grade": "A+"},
    {"Name": "Rahul", "Grade": "C"}
]
```

```
df = pd.DataFrame(students)
print(df)
```

30. (b) import pandas as pd

```
data = {
    "Gujarat": "Gandhinagar",
    "Rajasthan": "Jaipur",
    "Punjab": "Chandigarh"
}
```

```
s = pd.Series(data)
print(s)
```

Prep Tool:

- **Concept Applied:** Pandas DataFrame and Series creation
- **Common Mistake:** Using a tuple instead of a dictionary; wrong case in Series
- **Answering Tip:** Emphasise key-value logic for Series
- **High-Value Point:** Clean structure and capitalized method names

31. (a) CREATE TABLE EMPLOYEES (
EmpID INTEGER PRIMARY KEY,
EmpName VARCHAR(30),
Department VARCHAR(20),
Salary FLOAT(8,2),
DOJ DATE
);

(b) INSERT INTO EMPLOYEES

```
VALUES (101, 'Ramesh Sharma',
'Finance', 55000.75, '2019-06-01');
```

Prep Tool:

- **Concept Applied:** Table creation, constraints, data types
- **Common Mistake:** Using DATE without proper format or missing constraints
- **Answering Tip:** Always list data types + constraints (e.g., PRIMARY KEY)
- **High-Value Point:** Include precision like FLOAT(8,2) and formatted date

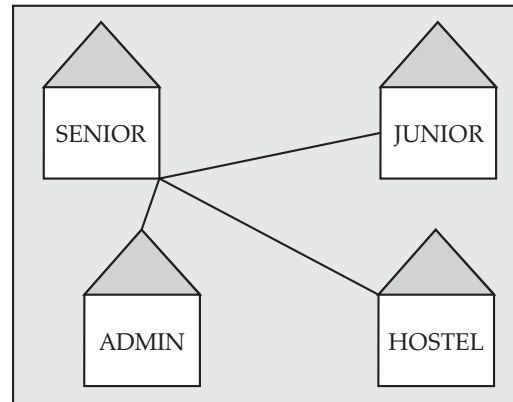
32. (a) (i) `SELECT SUBJECT, AVG(SCORE) AS Avg_Score FROM GRADES GROUP BY SUBJECT;`
(ii) `SELECT DISTINCT GRADE, SCORE FROM GRADES ORDER BY SCORE DESC;`
(iii) `SELECT STUDENTS.STU_NAME, GRADES.SUBJECT FROM STUDENTS JOIN GRADES ON STUDENTS.STU_ID = GRADES.STU_ID;`
- (b) (i) The attribute ProductID can be considered as the Primary Key because it uniquely identifies each product in the table.
(ii) SQL query to increase the price of all "Electronics" items by 10%:
`UPDATE PRODUCT SET Price = Price * 1.10 WHERE Category = 'Electronics';`
(iii) Output of the query `SELECT Category, AVG(Price) FROM PRODUCT GROUP BY Category;` will be:
Stationery 30
Electronics 600
Accessories 800

SECTION-D

33. (i) `import matplotlib.pyplot as plt`
(ii) `plt.bar(quantities, labels=fruits)`
(iii) `plt.title('FruitSaleDistribution')`
(iv) `plt.show()`
34. (a) (i) `SELECT DISTINCT Transporter FROM Bus;`
(ii) `SELECT Transporter, SUM(Charges) FROM Bus GROUP BY Transporter;`
(iii) `SELECT Transporter, AVG(Distance) FROM Bus GROUP BY Transporter;`
(iv) `SELECT Transporter, MIN(Nooftud) FROM Bus GROUP BY Transporter;`
34. (b) (i) 193
(ii) 194
(iii) 93.75
(iv) 6

SECTION-E

35. (i) Star Topology is suggested.



- (ii) Recommended Wing to install server: Wing S as it has maximum number of computers which will keep maximum traffic local to server.
(iii) Install the firewall between the School Network and the Internet (main router/modem)
(iv) Install Wi-Fi routers in central locations of each wing (especially Wing S and J) for even signal distribution
(v) Switch should be placed in each wing.
36. (i) `print(students_df.head(3))`
(ii) `print(students_df['Name'])`
(iii) `students_df.drop('Marks', axis=1, inplace=True)`
(iv) `print(students_df.loc[1:3, 'Name'])`
(v) `students_df.rename(columns={'Class': 'Standard'}, inplace=True)`
37. (a) (i) `SELECT SUM(pages) FROM Books;`
(ii) `SELECT LEFT(isbn_code, 5) FROM Books;`
(iii) `SELECT TRIM(author_name) FROM Authors;`
(iv) `SELECT MAX(price) FROM Books;`
(v) `SELECT COUNT(*) FROM Authors;`
- (b) (i) `SELECT AVG(marks_obtained) FROM Results;`
(ii) `SELECT RIGHT(roll_no, 2) FROM Students;`
(iii) `SELECT TRIM(student_name) FROM Students;`
(iv) `SELECT MAX(attendance) FROM Attendance;`
(v) `SELECT COUNT(*) FROM Students;`

Sample Question Paper-5

SECTION-A

1. True

Why? In Pandas, `DataFrame.rename()` allows changing row indexes and column labels using a dictionary. Example: `df.rename(columns={"old": "new"})`.

Why not? "False" would be wrong because `rename()` indeed supports renaming columns and rows.

2. (b) 8.76

Why? `TRUNCATE(num, d)` removes digits after `d` decimal places without rounding. So, 8.7654 becomes 8.76.

Why not?

(a) 8.77 □ this is rounding, not truncating.

(c) 8.75 □ not mathematically related to truncation here.

(d) 8.7 □ this is truncation to 1 decimal, not 2.

3. (b) *Do not open unknown email attachments.* – as it may contain any malicious program.

Why? Other options can be cautiously used.

4. (c) `df.shape`

Why? `.shape` returns a tuple (`rows`, `columns`).

Why not?

(a) `df.shape()` □ `shape` is not a method, so parentheses are wrong.

(b) `df.len()` □ doesn't exist in Pandas.

(d) `df.size` □ returns total number of elements, not rows/columns separately.

5. (b) Modem

Why? Modem converts digital data to analogue (and vice versa) for internet over telephone/cable lines.

Why not?

(a) Repeater □ only regenerates the signal in the LAN.

(c) Bridge □ connects two LAN segments.

(d) Router □ directs packets between networks, but internet access from ISP usually first needs modem.

6. (b) `MOD(10, 3)`

Why? `MOD(a, b)` returns the remainder after division.

Why not?

(a) `10 / 3` □ division result, not remainder.

(c) `ROUND()` □ rounds numbers.

(d) `CEIL()` □ rounds up to nearest integer.

7. (d) Trademark protects brand symbols/names.

Why not?

(a) Copyright □ protects creative works, not functional design.

(b) Patent □ protects inventions/ideas.

(c) Prototype – It's not an IPR trademark

8. (b) 0, 1, 2

Why? By default, Pandas assigns an integer index starting from 0.

Why not?

(a) 1, 2, 3 □ would require a custom index.

(c) 'a', 'b', 'c' □ also requires a custom index.

(d) Random numbers □ Pandas doesn't assign random indexes.

9. (a) It can have NULL values

Why? Primary keys cannot contain NULL.

Why not?

(b) Must be unique □ true.

(c) Can be multiple columns (composite key) □ true.

(d) Used to uniquely identify records □ true.

10. (b) SMTP

Why? Simple Mail Transfer Protocol sends outgoing emails.

Why not?

(a) FTP □ file transfer.

(c) VoIP □ voice over IP.

(d) POP □ retrieves incoming emails, not sends.

11. (a) Minimum marks

Why? `MIN()` returns the smallest value.

Why not?

(b) Maximum □ `MAX()`.

(c) Average □ `AVG()`.

(d) Total □ `SUM()`.

12. (a) `isnull()`

Why? `.isnull()` returns True for NaN.

Why not?

(b) `isempty()` □ not a Pandas function.

(c) `isNaN()` □ NumPy equivalent, but not Series method.

(d) `nullcheck()` is invalid.

13. (b) Cyber crimes and electronic commerce

Why? The IT Act, 2000 provides legal framework for cyber crimes, e-commerce, digital signatures, and electronic records in India.

Why not?

- (a) Agriculture is not related to IT Act.
(c) Protection of traditional knowledge comes under IPR laws, not IT Act.
(d) Copyright is covered by the Copyright Act, 1957, not IT Act.

14. (b) HAVING

Why? HAVING filters aggregate results.

Why not?

- (a) ORDER BY is sorts.
(c) WHERE is filters before grouping.
(d) LIMIT is restricts the rows count.

15. (b) Last row

Why? Negative index -1 refers to the last element.

Why not?

- (a) First row is index 0.
(c) Error is iloc accepts negative indexes.
(d) Second last is index -2.

16. (a) Bus

Why? Bus topology uses a single backbone cable and minimal cabling.

Why not?

- (b) Star is more cable needed.
(c) Mesh is most cable required.
(d) Hybrid is depends on combination.

17. (a) ATAB

Why? Starts at 2nd character ('A'), takes 4 chars "ATAB".

Why not?

- (b) DATA is would be SUBSTR(...,1,4).
(c) DATAB is would be length 5.
(d) TABA is would require starting from 3rd char.

18. (b) List of column labels

Why? `.columns` is an Index object containing column names.

Why not?

- (a) Number of rows is use `len(df)`.
(c) Column values is that's `df['col']`.
(d) Index names is `.index.names`.

19. (b) COUNT()

Why? COUNT works on any type to count rows.

Why not?

- (a) SUM is numeric only.

(c) AVG is numeric only.

(d) MOD is numeric only.

20. (d) A false, R true

21. (d) A false, R true

SECTION-B

22. (a) Method 1: From a List

Feature	Series	DataFrame
Structure	1D labelled array	2D labelled data structure (like a table)
Data Format	Similar to a single column	Collection of multiple Series (columns)
Axis	Only one axis (index)	Two axes (rows and columns)
Example Code	<code>pd.Series([10, 20, 30])</code>	<code>pd.DataFrame({'A': [10, 20], 'B': [30, 40]})</code>

OR

(b) **Open-source Python Library:** A freely available package whose source code is open to all for use, modification and distribution.

NumPy:

- Stands for **Numerical Python**
 - Helps perform fast mathematical operations on large arrays and matrices
 - Useful for statistical analysis, linear algebra, etc.
- Example: `np.mean([10, 20, 30])` is 20

Pandas:

- Stands for **Python Data Analysis Library**
 - Used to handle structured data using **DataFrames** and **Series**
 - Supports data cleaning, analysis, filtering and grouping
- Example: `df['Sales'].mean()` for average sales

23. Creative Commons (CC) Licences:

These are legal tools that allow creators to grant certain usage rights to the public while retaining others.

Benefits for creators:

- 1. Control:** Creators can decide how others can use their work (e.g., allow reuse but not commercial use).
- 2. Wider Reach:** Easier distribution leads to better visibility and collaboration.
- 3. Attribution:** Ensures proper credit is given to the original author.

24. (i) `SELECT SUBSTRING('Machine Learning with SQL', 9, 8);`
(ii) `SELECT INSTR('Machine Learning with SQL', 'SQL');`

- 25. (a) URL (Uniform Resource Locator):** It is the complete web address used to access a specific resource on the Internet.

Example:

- URL: `https://www.example.com/page.html`
- Domain Name: `www.example.com`

Difference:

- A domain name is part of a URL.
- URL gives full path including domain, protocol and file.

OR

- (b) Website:** A collection of interlinked webpages hosted under a domain name.

Webpage: A single document (like home, about, contact) on the internet.

Difference with Example:

- Website: `www.cbsenotes.com`
- Webpage: `www.cbsenotes.com/contact.htm`

- 26. Composite Key:** A primary key formed by combining two or more columns to uniquely identify a row in a table.

Use Case: When no single column is unique by itself.

Example: In a table ENROLLMENT(StudentID, CourseID), combination is unique, not individually.

- 27. E-waste:** Discarded electronic devices like old mobiles, computers, batteries, etc.

Management methods:

1. **Recycling:** Reuse parts or recover metals.
2. **Proper disposal:** Use certified e-waste collection centres

- 25. (a)**

```
import matplotlib.pyplot as plt
x = ['Jan', 'Feb', 'Mar']
y = [10, 15, 12]
plt.bar(x, y)
plt.xlabel('Months')
plt.show()
```

OR

- (b)**

```
import pandas as pd
temps = [40, 35, 38]
cities = ['Delhi', 'Mumbai', 'Kolkata']
s = pd.Series(temps, index=cities)
print(s)
```

SECTION-C

- 29. (i)** Throwing electronic waste like mobile phones into household trash can lead to soil and water pollution because such devices contain hazardous materials like lead, mercury and cadmium. These substances can seep into the ground and contaminate underground water sources.
- (ii)** E-waste should be handed over to authorised e-waste recycling centres or collection points.

Many cities have designated drop zones or recycling drives where electronic devices can be safely disposed of.

- (iii) Recycling helps recover valuable materials like gold, copper and plastics**, which reduces the need for mining and conserves natural resources. It also prevents toxic substances from entering the ecosystem, thus protecting both human health and the environment.

- 30. (a)**

```
import pandas as pd
books = [
{"Title": "Python 101", "Author": "John"},
{"Title": "Data World", "Author": "Aarti"},
{"Title": "AI Basics", "Author": "Vikram"},
{"Title": "SQL Master", "Author": "Neha"}
]
df = pd.DataFrame(books)
print(df)
```

OR

- (b)**

```
import pandas as pd
values = ["Guido", "Gosling", "Bjarne"]
indices = ["Python", "Java", "C++"]
s = pd.Series(values, index=indices)
print(s)
```

- 31. CREATE TABLE STUDENTS (**
StudentID NUMERIC PRIMARY KEY,
FirstName VARCHAR(20),
LastName VARCHAR(10),
DateOfBirth DATE,
Percentage FLOAT(10,2)
);
INSERT INTO STUDENTS
VALUES (1, 'Supriya', 'Singh', '2010-08-18', 75.5);
- 34. (a) (i)** **SELECT TITLE, AUTHOR FROM BOOKS**
WHERE PRICE > 500;
- (ii)** **SELECT ISSUE.STUDENT_NAME, BOOKS.**
TITLE FROM ISSUE JOIN BOOKS ON
ISSUE.BOOK_ID = BOOKS.BOOK_ID
WHERE ISSUE.RETURNED = 'NO';
- (iii)** **SELECT TITLE, PRICE FROM BOOKS**
ORDER BY PRICE DESC;

OR

- (b) (i)** **SELECT CUSTOMER_NAME FROM**
CUSTOMERS WHERE CUSTOMER_ID IN
(SELECT CUSTOMER_ID FROM ORDERS
GROUP BY CUSTOMER_ID HAVING
COUNT(*) > 1);
- (ii)** **SELECT ORDER_ID, CUSTOMER_**
NAME, PRODUCT, ORDER_DATE
FROM ORDERS JOIN CUSTOMERS ON
ORDERS.CUSTOMER_ID = CUSTOMERS.

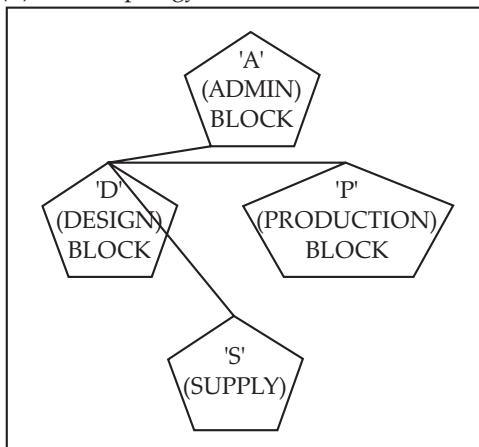
CUSTOMER_ID WHERE CITY IN
(Mumbai, 'Delhi');
(iii) SELECT COUNT(*) FROM ORDERS
WHERE PRODUCT = 'Laptop';

SECTION-D

33. (i) matplotlib.pyplot
(ii) sales
(iii) ylabel
(iii) 'Mobile Sales in Q1'
34. (a) (i) SELECT UPPER(TITLE) FROM MOVIE;
(ii) SELECT MAX(RATING) FROM MOVIE;
(iii) SELECT TITLE, LENGTH(TITLE) FROM MOVIE;
(iv) SELECT MCODE, RATING FROM MOVIE
ORDER BY RATING ASC;
- OR**
- (b) (i) SELECT LOWER(NAME) FROM STUDENT;
(ii) SELECT COUNT(*) FROM STUDENT
WHERE COURSE = 'BCA';
(iii) SELECT NAME, LENGTH(NAME) FROM STUDENT;
(iv) SELECT SID, GRADE FROM STUDENT
ORDER BY GRADE DESC;

SECTION-E

35. (i) LAN (Local Area Network)
(ii) Star Topology



- (iii) (a) Repeater – Repeater is required between block P to D as distance between them is 150m which will make signals weak.
(b) Hub/Switch – To be placed inside each block for connectivity
- (iv) Video Conferencing software: Teams, Zoom, Skype, etc. Protocol of Video Conferencing software: VoIP.
- (v) Since the block D is having the greatest number of computers, which is 80. So, as per 80-20 rule the most suitable place to set up the server is block D.

36. (i) `print(df1.tail(3))`
(ii) `print(df1["Name"])`
(iii) `df1 = df1.drop("Marks", axis=1)`
`print(df1)`
(iv) `print(df1.loc[1:3, "Name"])`
(v) `df1 = df1.rename(columns={"Name": "StudentName"})`
`print(df1)`
37. (a) (i) SELECT AVG(price) FROM Products;
(ii) SELECT LEFT(product_name, 4) FROM Products;
(iii) SELECT COUNT(*) FROM Products;
(iv) SELECT MAX(stock_quantity) FROM Products;
(v) SELECT UPPER(product_name) FROM Products;

OR

- (b) (i) SELECT LENGTH(full_name) FROM Customers;
(ii) SELECT LOWER(email) FROM Customers;
(iii) SELECT COUNT(DISTINCT city) FROM Customers;
(iv) SELECT TRIM(full_name) FROM Customers;
(v) SELECT * FROM Customers ORDER BY full_name ASC;

Sample Question Paper-6

SECTION-A

1. True

Why? `pd.DataFrame()` accepts a dictionary of lists (or arrays) where keys are column names and values are lists representing data.

Why not? Because this is a basic and correct way to create a DataFrame — so marking it false would ignore Pandas' official capability.

2. (b) class 12 ip

Why? `LCASE()` (or `LOWER()`) converts all characters in a string to lowercase.

Why not?

(a) `CLASS 12 IP` → unchanged text, not lowercase.

(c) `Class 12 Ip` → title case, not lowercase.

(d) error → function is valid in MySQL.

3. (c) Reporting cyberbullying on a school portal

Why? It's ethical and legal to report harmful online behaviour.

Why not?

(a) **Sharing pirated movies** → illegal, violates copyright.

(b) **Accessing someone's email** → unauthorised access is a cybercrime.

(d) **Downloading paid apps for free** → piracy, illegal.

4. (a) `read_csv()`

Why? `pd.read_csv()` is the standard Pandas function to read CSV files.

Why not?

(b) `import_excel()`,

(c) `load_excel()`,

(d) `open_excel` → these functions don't exist in Pandas.

5. (b) Modem

Why? Modem stands for Modulator-DEModulator, which is used for dial-up/DSL connections.

Why not?

(a) **Router** → routes data between networks.

(c) **Gateway** → connects networks with different protocols.

(d) **Switch** → connects devices in a LAN.

6. (b) 13.8

Why? Rounds to 1 decimal place → 13.75 becomes 13.8.

Why not?

(a) 13.7 → would be truncation, not rounding.

(c) 13,

(d) 14 → whole number rounding.

7. (c) Copyright

Why? Copyright protects original creative works like music, songs, jingles, books, or software. The advertisement jingle is a creative work, so it is covered by copyright.

Why not?

(a) **Patent:** Protects inventions and technical processes, not songs or jingles.

(b) **Trademark:** Protects brand names, logos, and symbols, not creative works like jingles.

(d) **Trade Secret:** Protects confidential business information (like formulas or methods), not publicly shared music.

8. (c) `head()`

Why? `Series.head(n)` returns the first n elements.

Why not?

(a) `top()` → no such Pandas method.

(b) `begin()` → no such method.

(d) `first()` → exists for time-series index, not general Series.

9. (b) Only one

Why? A table can have only one primary key, but it can be composite (multiple columns).

Why not?

(a) **One or more** → incorrect, cannot have more than one.

(c) **Unlimited** → not possible.

(d) **None** → every table should ideally have one primary key.

10. (a) Remote Access

Why? Accessing a computer from another location via internet = remote access.

Why not?

(b) **Cloud Backup** → storing data online.

(c) **Email** → unrelated.

(d) **Web Browsing** → general internet use.

11. (b) Only students with non-NULL marks

Why? `COUNT(column)` ignores NULL values.

Why not?

- (a) **Total number of students** → use COUNT(*).
 (c) **All rows including NULLs** → false.
 (d) **Error** → valid query.
- 12. (c)** Aligns by index and fills unmatched values as NaN
Why? add() performs index alignment.
Why not?
 (a) **Adds without considering indices** → wrong, it matches by index.
 (b) **Adds only common indices** → wrong, includes all indices.
 (d) **Adds values with default index** → not correct unless indices match.
- 13. (c)** Information Technology Act, 2000
Why? IT Act gives legal recognition to e-records & signatures in India.
Why not? a, b, d → these names are incorrect or fictional.
- 14. (b)** ORDER BY col1, col2
Why? This syntax sorts by col1, then col2 for ties.
Why not?
 (a) **ORDER BY col1 OR col2** → invalid SQL.
 (c) **ORDER BY (col1 + col2)** → sorts by sum, not separately.
 (d) **GROUP BY** → groups rows, not sorts.
- 15. (b)** Rows with indices 3 to 6
Why? loc is inclusive for both start and end.
Why not?
 (a) **3 to 5** → would be slicing with iloc.
 (b) **4 to 6** → wrong start.
 (d) **Error** → valid operation.
- 16. (b)** Mesh
Why? Mesh has multiple paths, so one failure doesn't disrupt the network.
Why not?
 (a) **Star** → hub failure kills network.
 (b) **Bus** → single cable failure stops all.
 (c) **Bus** → duplicate option.
- 17. (a)** LEFT('PYTHON', 3)
Why? LEFT returns first N characters.
Why not?
 (b) **RIGHT('PYTHON', 3)** → returns last 3.
 (c) **SUBSTRING('PYTHON', 4, 3)** → returns 'HON'.
 (d) **FIRST()** → not valid SQL standard.
- 18. (c)** True
Why? Returns Boolean True if DataFrame is empty.
Why not?
- (a) **'Yes'** → not string.
 (b) **0** → integer, not boolean.
 (d) **False** → opposite.
- 19. (b)** GROUP BY
Why? Used with COUNT, SUM, AVG, etc., to group rows.
Why not?
 (a) **ORDER BY** → for sorting.
 (b) **HAVING** → filters after grouping.
 (d) **WHERE** → filters before grouping.
- 20. (a)** Both True, R correctly explains A
Why? drop() works for both rows & columns, axis=0 → rows, axis=1 → columns.
Why not? Other options deny the correct relation.
- 21. (d)** A is False, R is True
Why? **Assertion:** DELETE removes rows, not table. DROP TABLE removes entire table.
Reason: Other options incorrectly claim A is true.

SECTION-B

- 22. (a)** Indexing in a Pandas Series is used to access individual elements using a label or position. By default, Pandas assigns integer indices starting from 0, but custom labels can also be provided.
- ```
import pandas as pd
data = [10, 20, 30]
index = ['Math', 'Science', 'English']
s = pd.Series(data, index=index)
print(s)
```

OR

- (b) Matplotlib is a Python library used for creating visual representations of data, such as charts and graphs. It helps users quickly identify trends, patterns and outliers in data.

### Chart Type: Bar Chart

A bar chart displays categorical data with rectangular bars.

### Use Case Example:

To compare the sales of different products, a bar chart can be used:

```
import matplotlib.pyplot as plt
products = ['A', 'B', 'C']
sales = [100, 150, 90]
plt.bar(products, sales)
plt.title('Product Sales')
plt.show()
```

- 23.** Copyright gives legal rights to creators over their digital content (e.g., images, code, music). It prevents unauthorised use, copying, or distribution.

Benefits to Creators:

- Retain ownership and control



- Earn income through licensing or sales
- Gain recognition for original work

**Benefits to Users:**

- Access to authentic content
- Clear usage guidelines
- Encourages creativity by respecting rights

24. (i) `SELECT INSTR('Digital Communication Era', 'Comm');`  
 (ii) `SELECT LOWER('Digital Communication Era');`
25. (a) URL (Uniform Resource Locator) is the address used to access resources on the internet.

**Main Components:**

**Protocol:** Communication method (e.g., https)

**Domain:** Website name (e.g., example.com)

**Path:** Specific page/resource (e.g., /products/index.html)

Example URL: `https://www.example.com/products/index.html`

- **Protocol:** https
- **Domain:** www.example.com
- **Path:** /products/index.html

OR

- (b) Third-party cookies are created by domains other than the one the user is currently visiting, typically used by advertisers for tracking user behaviour across multiple sites.

Why blocked/restricted?

- Privacy concerns
- Prevent user tracking without consent
- Modern browsers aim to provide safe, private browsing experiences.

26. A Primary Key is a column (or set of columns) that uniquely identifies each record in a table.

**Significance:**

- Prevents duplicate entries
- Ensures that no row has a null or missing identifier
- Maintains referential integrity when used in foreign key relationships
- It guarantees that each record is uniquely and reliably identifiable.

27. Prolonged poor posture can cause various health issues, including:

- Neck and back pain from slouching or bending
- Eye strain due to improper screen distance
- Carpal tunnel syndrome from incorrect hand positioning
- Headaches and fatigue due to muscle tension
- Using ergonomic chairs, proper screen alignment and regular breaks can help reduce these problems.

25. (a) `import pandas as pd`  
`records = [['Tom', 21], ['Jerry', 22], ['Spike', 20]]`

```
df = pd.DataFrame(records,
columns=['Name', 'Age'])
print(df)
```

OR

- (b) `import pandas as pd`  
`data = {'Name': ['Riya', 'Aman', 'Sana'], 'Age': [19, 21, 22]}`  
`df = pd.DataFrame(data)`  
`print(df.head(2))`

## SECTION-C

29. (i) Electronic devices contain toxic substances like lead, mercury and cadmium. When disposed of in household bins, they can leak into soil and water, causing pollution and health hazards. Proper e-waste management ensures safe recycling and prevents environmental damage.
- (ii) Lead is used in soldering circuit boards and is harmful to the nervous system and environment.
- (iii) She can use Karo Sambhav, Apple Trade-In or EcoReco, which are platforms that collect and recycle old electronics responsibly.

30. (a) `import pandas as pd`  
`subjects = pd.Series(["English", "Physics", "Chemistry", "Maths"])`  
`marks = pd.Series([90, 75, 80, 95])`  
`df = pd.DataFrame({"Subject": subjects, "Marks": marks})`  
`print(df)`

OR

- (b) `import pandas as pd`  
`series = pd.Series(["Bill Gates", "Elon Musk", "Mark Zuckerberg"],`  
`index=["Microsoft", "Tesla", "Facebook"])`  
`print(series)`

31. (i) `CREATE TABLE BOOKS (`  
`ISBN VARCHAR(13) PRIMARY KEY,`  
`Title VARCHAR(50),`  
`Author VARCHAR(30),`  
`PublishedOn DATE,`  
`Price FLOAT(8,2));`
- (ii) `INSERT INTO BOOKS (ISBN, Title, Author, PublishedOn, Price)`  
`VALUES ('9780132350884', 'Clean Code', 'Robert C. Martin', '2008-08-01', 499.99);`

32. (a) (i) `SELECT PRODUCTNAME, SUPPLIER.`  
`SUPPLIER_NAME`  
`FROM PRODUCT`  
`JOIN SUPPLIER ON PRODUCT.SUP_ID =`  
`SUPPLIER.SUP_ID;`
- (ii) `SELECT * FROM PRODUCT`

WHERE PRICE > 500;

(iii) SELECT SUP\_ID, SUM(PRICE) AS Total\_Price  
FROM PRODUCT  
GROUP BY SUP\_ID;

OR

- (b) (i) SELECT COUNT(\*) AS Present\_Count  
FROM ATTENDANCE  
WHERE Date = '2025-07-20' AND Status = 'Present';
- (ii) SELECT STUDENTS.Name  
FROM STUDENTS  
JOIN ATTENDANCE ON STUDENTS.StudentID = ATTENDANCE.StudentID  
WHERE ATTENDANCE.Status = 'Absent';
- (iii) SELECT STUDENTS.Name, ATTENDANCE.Status  
FROM STUDENTS  
JOIN ATTENDANCE ON STUDENTS.StudentID = ATTENDANCE.StudentID;

### SECTION-D

34. (i) matplotlib.pyplot  
(ii) books\_read  
(iii) ylabel  
(iv) Number of Books Read by Students
34. (a) (i) SELECT YEAR(MIN(TRANSACTION\_DATE)) FROM BLOCKCHAIN;  
(ii) SELECT MONTH(MAX(TRANSACTION\_DATE)) FROM BLOCKCHAIN;  
(iii) SELECT \* FROM BLOCKCHAIN WHERE MONTHNAME(TRANSACTION\_DATE)='MAY';  
(iv) SELECT COUNT(ID) FROM BLOCKCHAIN WHERE YEAR(TRANSACTION\_DATE)=2022;

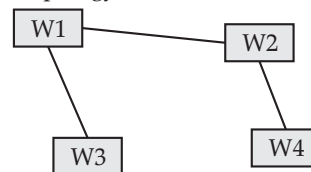
OR

|         |                   |
|---------|-------------------|
| (b) (i) | COUNT (Product)   |
|         | 6                 |
| (ii)    | SUM (Price * Qty) |
|         | 34,000            |
| (iii)   | LEFT (Product,4)  |
|         | FOUN              |
|         | NIGH              |

|      |             |
|------|-------------|
| (iv) | MAX (PRICE) |
|      | 2,100       |

### SECTION-E

35. (i) Star topology



- (ii) (a) LAN  
(b) WAN
- (iii) (a) Repeater should be placed in between wings W3 to W2 and W1 to W4 as distance is more.  
(b) Repeater should be placed in between wings W3 to W2 and W1 to W4 as distance is more.
- (iv) Protocol: VoIP  
Example to send messages instantly: WhatsApp
- (v) Wireless Local Area Network (WLAN)
36. (i) print(students['Name'])  
(ii) print(students.head(3))  
(iii) students.loc[len(students)] = [106, "Neha", 11, 91]  
(iv) print(students[students['Class'] == 12])  
(v) students\_dropped = students.drop('Marks', axis=1)  
print(students\_dropped)
37. (a) (i) SELECT YEAR(JoinDate) AS JoinYear FROM Employees;  
(ii) SELECT SUM(Quantity) AS TotalQuantity FROM Inventory;  
(iii) SELECT LOWER(email) AS lower\_email FROM Users;  
(iv) SELECT COUNT(\*) AS ElectronicsCount FROM Products WHERE Category = 'Electronics';  
(v) SELECT AVG(OrderAmount) AS AvgCompletedOrder FROM Orders WHERE Status = 'Completed';

OR

- (b) (i) SELECT ROUND(45.67891, 1);  
(ii) SELECT SQRT(144);  
(iii) SELECT INSTR('edutechplatform', 'tech');  
(iv) SELECT RIGHT('SmartLearning', 4);  
(v) SELECT TRIM(contact\_number) AS CleanNumber FROM Customers;



# Sample Question Paper-7

## SECTION-A

1. False

**Why?** shape returns a **tuple** (rows, columns), not the total number of elements. Total elements would be rows \* columns or use .size.

**Why not?** If you think it's True, you're confusing .shape with .size.

2. (c) CONCAT()

**Why?** CONCAT() joins two or more strings in SQL. Example: SELECT CONCAT('Hello', ' World'); → "Hello World".

**Why not?**

(a) JOIN() is for combining rows from multiple tables.

(b) MERGE() is not a standard SQL string function (used in some DB operations, not for strings).

(d) APPEND() is not a standard SQL string function.

3. (c) Keeping software and antivirus up to date

**Why?** Regular updates patch security vulnerabilities and help prevent hacking/malware.

**Why not?**

(a) Same password for all sites = high risk.

(b) Clicking random links = phishing risk.

(d) Ignoring updates leaves you exposed.

4. (c) df.sort\_values()

**Why?** sort\_values() sorts DataFrame rows by a column's values.

**Why not?**

(a) order\_by() is SQL syntax, not Pandas.

(b) sort() in Pandas is deprecated for DataFrames.

(d) sort\_column() doesn't exist.

5. (c) Switch

**Why?** Switches use MAC addresses to forward frames at the data link layer (Layer 2).

**Why not?**

(a) RJ45 is a connector.

(b) Modem connects to ISP.

(d) Repeater only regenerates signal.

6. (c) ROUND(num, 0)

**Why?** ROUND() with precision 0 rounds to the nearest whole number.

**Why not?**

(a) FLOOR() always rounds down.

(b) TRUNCATE() cuts off decimals without rounding.

(d) MOD() gives remainder.

7. (b) To receive legal ownership and protection

**Why?** Copyright registration grants legal proof and rights over your work.

**Why not?**

(a) Hackers = unrelated.

(b) Marketing = not main reason.

(d) Patents = different law.

8. (a) pd.Series([1, 2, 3], index=['x', 'y', 'z'])

**Why?** index parameter sets custom labels.

**Why not?** olabels/name/id aren't valid parameters for index labels.

9. (b) set of attributes that can uniquely identify each record in a table.

**Why?** A candidate key is any set of attributes that uniquely identifies a row.

**Why not?**

(a) incomplete definition

(c) foreign key definition

(d) invalid — keys can't be NULL.

10. (c) Voice communication over data networks

**Why?** VoIP uses the internet/data network to make calls, often cheaper and flexible.

**Why not?**

(a) Requires landline = false

(b) High charges = opposite of VoIP

(d) 4G SIM only = false (works on broadband too)

11. (c) AVG(age)

**Why?** AVG() calculates average in SQL.

**Why not?**

(a) MEAN/AVERAGE not standard SQL

(b) TOTAL() = sum, not average.

12. (c) 'a', 'b', 'c', 'd'

**Why?** Pandas aligns indexes before addition; result index is the union of both.

**Why not?**

(a) ['a', 'b', 'c'] = A only

(b) ['b', 'c'] = intersection

(d) ['b'] = single index only.

- 13. (c)** Information Technology Act, 2000  
**Why?** IT Act covers e-commerce legality and cybercrime prevention.  
**Why not?** Other options are unrelated.
- 14. (a)** COUNT()  
**Why?** COUNT() counts rows (or non-NULL values if column specified).  
**Why not?**  
 (b) SUM = totals numeric values.  
 (c) TOTAL()/NUMBER(\*) not standard SQL.
- 15. (b)** It returns the last two rows  
**Why?** tail(n) shows last n rows.  
**Why not?**  
 (a) Drop = drop() method.  
 (c) Random = sample() method.  
 (d) Rename = rename() method.
- 16. (d)** Star  
**Why?** Star is simple to expand and cost-effective compared to mesh.  
**Why not?**  
 (a) Ring/Tree more complex and costly.  
 (b) Mesh very costly.
- 17. (b)** SUBSTR()  
**Why?** SUBSTR() extracts part of a string from a given position.  
**Why not?**  
 (a) LENGTH() = string length  
 (c) TRIM() = remove spaces  
 (d) INSTR() = position of substring.
- 18. (c)** From scalar value  
**Why?** Pandas DataFrame requires an array-like or dict-like structure; scalar only works for Series, not DataFrame.  
**Why not?** Dictionary, list of lists and tuple of integers are valid.
- 19. (a)** AVG()  
**Why?** AVG() returns mean in SQL.  
**Why not?**  
 (b) MEAN() not SQL standard  
 (c) TOTAL() = sum  
 (d) SUM()/COUNT() works but not the direct SQL function.
- 20. (c)** Assertion True, Reason False  
**Why?** read\_csv() indeed reads data from a CSV into a DataFrame.  
 But it can handle headers, missing values, and different delimiters (using the delimiter or sep parameter).
- 21. (a)** Both True, Reason is the correct explanation.

**Why?** INSERT INTO is DML.

DML includes insert, update, delete.

## SECTION-B

- 22. (a)** Role of dtype in Pandas Series

The dtype attribute in a Pandas Series tells you the data type of the values stored in the Series (e.g., int64, float64, object).

It helps in:

- Understanding how data is stored in memory.
- Choosing the right operations (e.g., math ops work for numeric dtypes).
- Optimising performance by using efficient data types.

Example:

```
import pandas as pd
s = pd.Series([10, 20, 30])
print(s.dtype) # int64
```

OR

- (b)** NumPy in Python

NumPy (Numerical Python) is a Python library for fast numerical computation using multi-dimensional arrays.

**Why use NumPy arrays over Python lists:**

- NumPy arrays are faster because they store elements of the same type in contiguous memory.
- They support vectorized operations, meaning operations are applied to the whole array without loops.

**Example use case:**

```
import numpy as np
arr = np.array([1, 2, 3, 4])
print(arr * 2) # [2 4 6 8] - vectorized operation
```

- 23. Avoiding plagiarism**

Plagiarism can be avoided by:

- Rephrasing content in your own words.
- Giving credit to the original source.

Two tools/practices:

1. Turnitin / Grammarly — check for plagiarism.
2. Citation Managers (e.g., Zotero, Mendeley) — help reference sources properly.

- 24. (i)** SELECT SUBSTR('Learning Structured Query Language', 20, 5);  
**(ii)** SELECT LENGTH('Learning Structured Query Language');

- 25. (a)** Website vs Web Page

- Website: A collection of related web pages under a domain.

Example: [www.wikipedia.org](http://www.wikipedia.org) (whole site).

- Web Page: A single document on a website.

Example: [https://en.wikipedia.org/wiki/Python\\_\(programming\\_language\)](https://en.wikipedia.org/wiki/Python_(programming_language)) (specific page).

OR

**(b) Session Cookies vs Persistent Cookies**

- Session Cookies: Stored temporarily, deleted when browser closes.

Example: Shopping cart session on an e-commerce site.

- Persistent Cookies: Stored on disk for a set duration.

Example: "Remember Me" login on Gmail.

**26. Choosing Primary Key**

**If multiple columns qualify:**

- Designer chooses the one that is unique, stable and minimal in size.
- Remaining unique keys can be set as candidate keys.
- Only one primary key is chosen; others remain as alternate keys.

**27. Ergonomic Safety Tips**

1. Adjust chair and monitor height to maintain neutral posture.
2. Take regular breaks to avoid eye strain and muscle fatigue.

**25. (a) import pandas as pd**

```
data = {'Name': ['Anita', 'Sunil'],
 'Grade': ['A', 'B']} # Added quotes on Name
df = pd.DataFrame(data) # corrected case sensitivity of data
print(df['Grade']) # Changed 'Marks' to 'Grade'
```

OR

**(b) import pandas as pd**

```
data = [85, 92, 88]
students = ['Ravi', 'Neha', 'Tina']
df = pd.DataFrame(data, index=students, columns=['Marks'])
print(df)
```

## SECTION-C

**29. E-Waste & Water Pollution**

- (i) Link between e-waste and water pollution:**  
E-waste contains toxic substances like lead, mercury and cadmium. When dumped in landfills near water bodies, these chemicals leach into the soil and contaminate groundwater and river water, harming plants, animals and humans.
- (ii) Eco-friendly way to manage outdated devices:**  
The company can use E-waste recycling centres or donate functional laptops to schools/NGOs instead of dumping them.
- (iii) Why follow e-waste laws strictly:**

- Prevents environmental damage.
- Avoids legal penalties and fines.
- Protects public health and company reputation.

**30. (a)**

```
import pandas as pd
data = {"City": ["Mumbai", "Kolkata", "Bengaluru", "Jaipur"],
 "Population": [20400000, 14800000, 12000000, 4300000]}
df = pd.DataFrame(data)
print(df)
```

OR

**(b) import pandas as pd**

```
data = {
 "Japan": "Yen",
 "USA": "Dollar",
 "India": "Rupee"
}
s = pd.Series(data)
print(s)
```

- 31. (i)** CREATE TABLE COURSES (  
CourseID VARCHAR(10) PRIMARY KEY,  
Name VARCHAR(40),  
Duration INTEGER,  
Fee DECIMAL(7,2)  
);
- (ii)** INSERT INTO COURSES (CourseID, Name, Duration, Fee)  
VALUES ('C101', 'Data Analysis with Python', 6, 8500.50);

- 32. (a) (i)** SELECT Name FROM EMPLOYEE  
WHERE Department = 'IT'  
ORDER BY Name ASC;
- (ii)** SELECT UPPER(Month) FROM SALARY  
WHERE Amount > 60000;
- (iii)** SELECT EMPLOYEE.Name, SALARY.  
Month, SALARY.Amount  
FROM EMPLOYEE  
JOIN SALARY  
ON EMPLOYEE.EmployeeID = SALARY.  
EmployeeID;

OR

- (b) (i) Primary Key:**  
ProductID — because it uniquely identifies each product in the table, no two rows will have the same ProductID.
- (ii)** ALTER TABLE PRODUCT ADD  
StockQuantity NUMERIC;
- (iii) Output:**
- | Category    | TotalProducts |
|-------------|---------------|
| Electronics | 3             |
| Furniture   | 2             |

## SECTION-D

**34. Statement-1:** import matplotlib.pyplot as plt → needed for plotting.

**Statement-2:** plt.bar(students, marks, label='Math Marks') → creates bar chart.

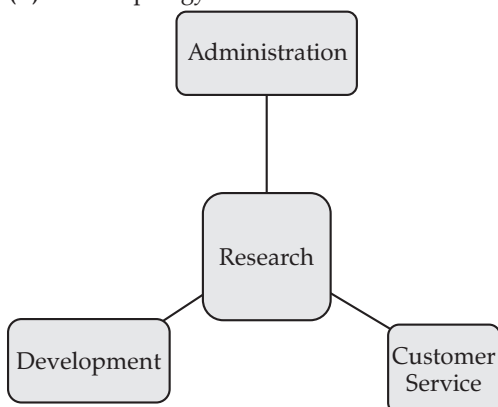
**Statement-3:** plt.title('Math Marks of Students') → sets chart title.

**Statement-4:** plt.savefig('math\_marks.png') → saves figure.

- 34. (a)**
- (i) `SELECT LOWER(Name) AS Name,  
LOWER(Department) AS Department  
FROM Employee ORDER BY Salary DESC;`
  - (ii) `SELECT EmpID, YEAR(Joining_Date) AS  
Joining_Year  
FROM Employee;`
  - (iii) `SELECT MAX(Salary) AS Highest_Salary  
FROM Employee;`
  - (iv) `SELECT Department, COUNT(*) AS  
Employee_Count  
FROM Employee  
GROUP BY Department;`
- OR**
- (b) (i) `SELECT UPPER(Title) AS Title,  
UPPER(Author) AS Author  
FROM Books  
ORDER BY Author ASC;`
- (ii) `SELECT BookID, MONTHNAME(Purchase_  
Date) AS Purchase_Month  
FROM Books;`
  - (iii) `SELECT AVG(Price) AS Average_Price  
FROM Books;`
  - (iv) `SELECT Author, COUNT(*) AS Total_Books  
FROM Books  
GROUP BY Author;`

## SECTION-E

- 35. (i)** Research is the most suitable place to place server as it has maximum number of systems.
- (ii)** Star Topology



(iii) Switch

(iv) WAN

(v) Repeater as it is used to strengthen the weak signals over long distances.

**36. (i)** Display the first two rows

```
print(df.head(2))
```

**(ii)** Add new column "Salary"

```
df["Salary"] = [75000, 68000,
82000, 70000, 65000]
```

**(iii)** Delete the column "Age"

```
df.drop(columns=["Age"],
inplace=True)
```

**(iv)** Rename "Department" to "Dept"

```
df.rename(columns={"Department":
"Dept"}, inplace=True)
```

**(v)** Display only "Name" and "Dept" columns

```
print(df[["Name", "Dept"]])
```

```
print(students_dropped)
```

**37. (a) (i)** `SELECT RIGHT(emp_code, 3) AS last_  
three_chars`

`FROM Employees;`

**(ii)** `SELECT SUM(salary) AS total_salary  
FROM Payroll;`

**(iii)** `SELECT MONTHNAME(join_date) AS  
month_name  
FROM Employees;`

**(iv)** `SELECT LCASE(email) AS lower_email  
FROM Clients;`

**(v)** `SELECT SYSDATE();`

**OR**

**(b) (i)** `SELECT LENGTH('InformaticsPractice') AS  
total_chars;`

**(ii)** `SELECT INSTR(Emp_Name, 'e')  
FROM Employees;`

**(iii)** `SELECT POWER(Product_Price, 3) AS  
price_cube  
FROM Products;`

**(iv)** `SELECT MAX(Marks) AS max_marks  
FROM Students;`

**(v)** `SELECT SUM(Quantity) AS total_quantity  
FROM Orders;`

# Sample Question Paper-8

## SECTION-A

1. True

*Explanation:* head(n) returns the first n rows of a DataFrame. If n is not specified, it defaults to 5

2. (b) 4

*Explanation:* The MOD function returns the remainder of division. Dividing 14 by 5 gives a remainder of 4.

3. (b) Phishing

*Explanation:* This is a case of Phishing, where attackers impersonate legitimate entities to steal sensitive information.

4. (b) pd.read\_csv()

*Explanation:* pd.read\_csv() is the correct function to load a CSV file into a Pandas DataFrame.

5. (b) Repeater

*Explanation:* A Repeater is used to regenerate and amplify signals to extend the range of a network.

6. (a) Rounds to two decimal places

*Explanation:* The ROUND() function rounds a number to the specified number of decimal places. ROUND(3.14159, 2) results in 3.14.

7. (a) Patent

*Explanation:* A Patent protects inventions and technical innovations, such as a new engine design.

8. (b) One-dimensional labelled array

*Explanation:* A Series is a one-dimensional labelled array capable of holding any data type, similar to a single column in a DataFrame.

9. (c) 3

*Explanation:* Candidate keys are attributes that can uniquely identify a record. EmpID, SSN, and Email are all unique identifiers, hence 3 candidate keys.

10. (c) WhatsApp Voice Call

*Explanation:* WhatsApp Voice Call uses VoIP (Voice over Internet Protocol), which transmits voice data over the internet.

11. (b) COUNT(column\_name)

*Explanation:* COUNT(column\_name) counts only the non-NULL entries in the specified column

12. (c) Returns a Series with the union of indices and NaN where labels don't match

*Explanation:* When two Series with different indices are multiplied, Pandas aligns them by index. Non-matching indices result in NaN.

13. (c) Information Technology (Amendment) Act, 2008

*Explanation:* The Information Technology (Amendment) Act, 2008 introduced provisions for cyber terrorism, data protection, and stronger penalties.

14. (b) GROUP BY

*Explanation:* GROUP BY is used to group rows that have the same values in specified columns, often used with aggregate functions

15. (b) df.loc[:2]

*Explanation:* df.loc[:2] selects rows with index labels 0, 1, and 2, effectively retrieving the first three rows

16. (b) Star

*Explanation:* In Star topology, all nodes are connected to a central device like a hub or switch, which manages communication.

17. (b) Convert all characters in a string to uppercase

*Explanation:* The UPPER() function converts all characters in a string to uppercase.

18. (b) pandas.DataFrame()

*Explanation:* pandas.DataFrame() creates an empty DataFrame with no rows and no columns.

19. (c) SUBSTRING()

*Explanation:* SUBSTRING() is a scalar function used to extract part of a string. It is not an aggregate function like COUNT() or AVG().

20. (a) Both A and R are true and R correctly explains A.

*Explanation:* Both the assertion and reason are true. df.head(0) returns an empty DataFrame with only column headers, which matches the explanation.

21. (d) A is False, but R is True.

*Explanation:* The assertion is false because most SQL dialects do allow changing column data types using ALTER TABLE. The reason is true.

## SECTION-B

22. (a) A DataFrame is a two-dimensional, tabular data structure with labelled axes (rows and columns). One property of a DataFrame is shape which returns a tuple indicating the number of rows and columns (e.g., (n\_rows, n\_cols)).

OR

(b) Differences between Series and DataFrame in Pandas:

(1) A Series is one-dimensional, while a DataFrame is two-dimensional (rows and columns).

(2) Both are mutable, but in Series only values can be changed, while in DataFrame both values and structure (rows/columns) can be changed.

**23.** E-waste (electronic waste) comprises discarded electrical or electronic devices.

Leaching of heavy metals (like lead and cadmium) from improperly dumped e-waste contaminates soil, reducing fertility and harming plant life.

**24.** import pandas as pd

```
ser_data = {'Apple': 3.0, 'Banana': 1.2, 'Cherry': 5.0}
prices = pd.Series(ser_data)
print(prices)
```

**25. (a)** A web server is software (and the hardware it runs on) that listens for HTTP requests and delivers the website's files (HTML, CSS, images) back to users' browsers.

Web hosting is the service of renting space on such a server—connected round the clock to the Internet—so Rohan's code and assets remain stored, maintained and accessible via his domain.

**OR**

(b) VoIP allows voice communication over the internet.

**Benefit:** cost-effective

**26. (i)** SELECT DAYNAME('2026-07-04');

(ii) SELECT LENGTH('Incredible India');

**27. Copyright** is a legal right that protects original creative works such as books, music, films, and software, giving the creator exclusive control over how their work is used and shared.

**Difference from a patent:**

Copyright safeguards artistic and literary expression, while a patent protects inventions and technical processes, granting exclusive rights to the inventor for a limited period.

**25. (a)**

|   | Item   | Cost |
|---|--------|------|
| 0 | Apple  | 3.5  |
| 1 | Banana | 1.2  |
| 2 | Cherry | 5.0  |

**OR**

|   | Country | Capital     |
|---|---------|-------------|
| 0 | USA     | Washington  |
| 2 | Mexico  | Mexico City |

## SECTION-C

**29. (i)** IP denotes creative outputs; IPR is the bundle of exclusive rights (patents, trademarks, etc.) granted by law to exploit IP.

(ii) Her purifier is a patentable subject matter under patent law.

(iii) Enforcing IPR maintains market exclusivity, rewards innovation and encourages ongoing tech advancement.

**30. (a)**

```
import numpy as np
import pandas as pd
marks = np.array([75, 82, 79, 88])
subjects = ['Physics', 'Chemistry', 'Biology', 'Mathematics']
s = pd.Series(marks, index=subjects)
```

**OR**

(b) import pandas as pd

```
data = [
 {'Name': 'Alice', 'Age': 30},
 {'Name': 'Bob', 'Age': 25},
 {'Name': 'Charlie', 'Age': 28}
]
df = pd.DataFrame(data)
print(df)
```

**31. (i)** CREATE TABLE TEACHERS (  
TeacherID INTEGER PRIMARY KEY,  
Name VARCHAR(40),  
Subject VARCHAR(30),  
JoinDate DATE

(ii) INSERT INTO TEACHERS (TeacherID, Name, Subject, JoinDate)  
VALUES (1001, 'Sandeep Roy', 'Mathematics', '2018-07-01');

**32. (a) (i)** SELECT Name FROM STUDENT WHERE  
Class = 9 ORDER BY

Name DESC;

(ii) SELECT LCASE(Subject) FROM MARKS  
WHERE Score > 75;

(iii) SELECT STUDENT.StudentID, MARKS.  
Subject, MARKS.Score FROM STUDENT  
JOIN MARKS  
ON STUDENT.StudentID = MARKS.  
StudentID;

**OR**

(b) (i) EmployeeID can be considered as Primary Key because it uniquely identifies each employee in the table.

(ii) ALTER TABLE Employee ADD Experience  
INT;

(iii)

| Department | COUNT(*) |
|------------|----------|
| IT         | 2        |
| Marketing  | 2        |
| Finance    | 1        |



## SECTION-D

34. (i) `import matplotlib.pyplot`  
 (ii) `plt.plot(Days, Temperature, label='Temperature')`  
 (iii) `plt.title('Weekly Temperature Trend')`  
 (iv) `plt.savefig('weekly_temperature.png')`
34. (a) (i) `SELECT UPPER(Name), UPPER(City)`  
`FROM Employee ORDER BY`  
`Name;`  
 (ii) `SELECT EmpID, MONTHNAME(Join_`  
`Date) AS Join_Month`  
`FROM Employee;`  
 (iii) `SELECT AVG(Salary) AS Average_Salary`  
`FROM Employee;`  
 (iv) `SELECT City, COUNT(*) AS Employee_`  
`Count`  
`FROM Employee GROUP BY City;`

OR

(b) (i)

| Name  | LENGTH(Name) |
|-------|--------------|
| Raj   | 3            |
| Tanya | 5            |

(ii)

| lower(Name) |
|-------------|
| Sneha       |

(iii)

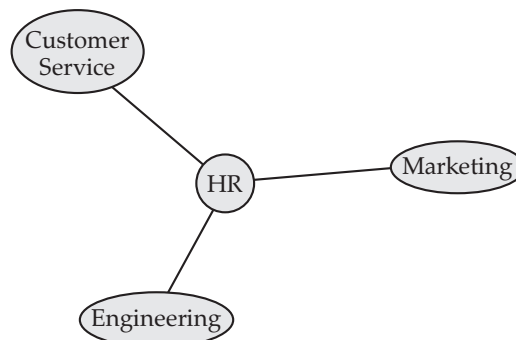
| AVG (Salary) |
|--------------|
| 62000        |

(iv)

| Name  | Salary |
|-------|--------|
| Raj   | 60000  |
| Tanya | 62000  |
| Sneha | 61000  |

## SECTION-E

35. (i) Server should be placed in HR department as it has maximum number of systems which will keep most of the traffic local to server.



- (ii) Star Topology  
 (iii) Switch/Hub  
 (iv) WAN(Wide Area Network), as the offices are located in different cities.  
 (v) Repeater
36. (i) Last three rows  
`df_students.tail(3)`  
 (ii) Add Credits column  
`df_students['Credits'] = [120, 110,`  
`130, 100, 125]`  
 (iii) Delete GPA column  
`df_students.drop('GPA', axis=1,`  
`inplace=True)`  
 (iv) Rename Major to Field  
`df_students.rename(columns =`  
`{ 'Major': 'Field'}, inplace=True)`  
 (v) Display Name and Credits  
`df_students[['Name', 'Credits']]`
37. (a) (i) `SELECT RIGHT(employee_id, 4) FROM`  
`Employees;`  
 (ii) `SELECT COUNT(Customer_ID) FROM`  
`Customers;`  
 (iii) `SELECT MONTH(hire_date) FROM`  
`Employees;`  
 (iv) `SELECT TRIM(City) FROM Addresses;`  
 (v) `SELECT SYSDATE();`

OR

- (b) (i) `SELECT LENGTH('InformationTechnolo`  
`gy');`  
 (ii) `SELECT INSTR(Course_Name, 'e') FROM`  
`Courses;`  
 (iii) `SELECT POWER(Score, 3) FROM Results;`  
 (iv) `SELECT MAX(Marks) FROM Students;`  
 (v) `SELECT MIN(Salary) FROM Staff;`

□□□

# Sample Question Paper-9

## SECTION-A

1. False  
*Explanation:* False. The `tail()` method returns the last `n` rows of a DataFrame, not the first. The method for the first `n` rows is `head()`.
2. (b) 0  
*Explanation:* The MOD function returns the remainder of division. Since 6 divided by 6 leaves no remainder, the result is 0.
3. (a) Phishing  
*Explanation:* This is an example of Phishing, where attackers create deceptive websites to trick users into revealing sensitive data.
4. (a) `df.to_csv('file.csv', index=False)`  
*Explanation:* The correct syntax is `df.to_csv('file.csv', index=False)`. This saves the DataFrame without including row indices in the CSV file.
5. (b) Router  
*Explanation:* A Router is responsible for directing data packets between networks based on IP addresses.
6. (a) 0 decimal places  
*Explanation:* If the second argument is omitted, SQL rounds the number to 0 decimal places by default.
7. (b) Copyright  
*Explanation:* Copyright protects literary works like novels, giving the author exclusive rights to reproduce and distribute the content.
8. (d) Consecutive integers starting from 0  
*Explanation:* If no index is specified, Pandas assigns consecutive integers starting from 0 as the default index.
9. (a) Degree = 5, Tuples = 500  
*Explanation:* The relation has 5 attributes (columns), so Degree = 5. It contains 500 records, so Tuples = 500.
10. (c) Skype Voice Call  
*Explanation:* Skype Voice Call uses VoIP (Voice over Internet Protocol) to transmit voice data over the internet.
11. (c) `COUNT(DISTINCT column_name)`  
*Explanation:* `COUNT(DISTINCT column_name)` counts only the unique, non-NULL values in the specified column.
12. (c) A union of both indices with NaN for missing entries  
*Explanation:* The result is a Series with the union of both indices, and NaN for entries where labels don't match.
13. (b) Controller of Certifying Authorities  
*Explanation:* The Controller of Certifying Authorities (CCA) is responsible for licensing and regulating digital signature providers under the IT Act.
14. (c) HAVING  
*Explanation:* The HAVING clause is used to apply conditions on grouped data after aggregation.
15. (a) `df.loc[2:5]`  
*Explanation:* `df.loc[2:5]` retrieves rows with labels 2, 3, 4, and 5. Label-based indexing in `loc` is inclusive.
16. (c) Bus  
*Explanation:* Bus topology uses a single backbone cable with terminators at both ends. All nodes connect to this cable.
17. (c) Converts all characters in a string to lowercase  
*Explanation:* The `LOWER()` function converts all characters in a string to lowercase.
18. (b) `pandas.DataFrame({'x':[1,2], 'y':[3,4]})`  
*Explanation:* `pandas.DataFrame({'x':[1,2], 'y':[3,4]})` creates a DataFrame from a dictionary where each key maps to a list of equal length.
19. (b) `LENGTH()`  
*Explanation:* `LENGTH()` is a scalar function that returns the length of a string. It is not an aggregate function like `SUM()` or `AVG()`.
20. (b) Both A and R are True, but R does not correctly explain A.  
*Explanation:* Both A and R are true, and R correctly explains A. `pop()` removes the column and returns it as a Series.
21. (c) A is True, but R is False.  
*Explanation:* A is true, but R is false. `DROP TABLE` permanently deletes both the structure and data.
22. (a) A Series is a one-dimensional labelled array capable of holding any data type.  
One property of a Series is `dtype`, which indicates the data type of its elements (e.g., `int64`, `float64`, `object`).

## SECTION-B



OR

- (b) A Series has only an index for its single axis.

A DataFrame has both an index (row labels) and columns (column labels).

23. E-waste includes obsolete computers, phones and other gadgets.

When e-waste is dumped near waterways, toxic chemicals (such as mercury and brominated flame retardants) can leach into groundwater and rivers, polluting drinking water and aquatic habitats.

24. 

```
import pandas as pd
scores = [85, 90, 95]
labels = ['A', 'B', 'C']
s = pd.Series(scores, index=labels)
print(s)
```

25. (a) The Domain Name System (DNS) acts like the Internet's phonebook, translating Mohan's human-friendly domain (e.g., example.com) into the numeric IP address of his web server.

When someone enters his domain, DNS resolution points their browser to the exact server where his site is hosted.

OR

- (b) VoIP allows voice communication over the internet.

Benefit: cost-effective

26. (i) `SELECT YEAR('2025-12-25') AS the_year;`  
 (ii) `SELECT SUBSTRING('Incredible India', 3, 8) AS extracted_part;`

27. **Plagiarism** refers to the act of using someone else's work, ideas, or expressions without proper acknowledgment, presenting them as one's own. It is considered an ethical violation in academic and creative fields.

#### Difference from Copyright Infringement:

Plagiarism is an issue of honesty and attribution, while copyright infringement is a legal offense involving the unauthorized use of protected content. Plagiarism may not always break the law, but copyright infringement can lead to legal consequences.

28. (a)
- |   | CountryName | CapitalCity |
|---|-------------|-------------|
| 0 | India       | New Delhi   |
| 1 | USA         | Washington  |
| 2 | Brazil      | Brasília    |

OR

- (b)
- |   | Fruit  | Color |
|---|--------|-------|
| 0 | Apple  | Red   |
| 2 | Cherry | Red   |

## SECTION-C

29. (i) Intellectual Property is the legal concept of creations of intellect; Intellectual Property Rights are the government-backed rights (e.g., patents) that protect those creations.

- (ii) His sanitation unit qualifies for patent protection.

- (iii) Patents guard against unauthorised competition, support licensing opportunities and foster a climate where innovation thrives.

30. (a)
- ```
import numpy as np
import pandas as pd
marks = np.array([68, 74, 81, 77])
subjects = ['History', 'Geography', 'Economics', 'Sociology']
s = pd.Series(marks, index=subjects)
print(s)
```

OR

- (b)
- ```
import pandas as pd
data = [
 {'Fruit': 'Apple', 'Price': 3.5},
 {'Fruit': 'Banana', 'Price': 1.2},
 {'Fruit': 'Cherry', 'Price': 5.0}
]
df = pd.DataFrame(data)
print(df)
```

31. (i) `CREATE TABLE PROJECTS (`  
`ProjectID INTEGER PRIMARY KEY,`  
`ProjectName VARCHAR(50),`  
`StartDate DATE,`  
`Budget FLOAT(6,2)`  
`);`  
 (ii) `INSERT INTO PROJECTS (ProjectID,`  
`ProjectName, StartDate, Budget)`  
`VALUES (301, 'AI Development', '2023-01-15',`  
`25.50);`

32. (a) (i) `SELECT Class, COUNT(*) AS TotalStudents`  
`FROM STUDENT GROUP BY Class;`  
 (ii) `SELECT Subject, Score FROM MARKS`  
`WHERE Score = (SELECT MAX(Score)`  
`FROM MARKS);`  
 (iii) `SELECT STUDENT.Name, MARKS.Score`  
`FROM STUDENT`  
`JOIN MARKS ON STUDENT.StudentID =`  
`MARKS.StudentID`  
`WHERE MARKS.Score < 70;`

OR

- (b) (i) EmployeeID can be considered as Primary Key because it uniquely identifies each employee in the table.  
 (ii) `ALTER TABLE Employee ADD Experience`  
`INT;`  
 (iii)

| Department | COUNT(*) |
|------------|----------|
| HR         | 2        |
| IT         | 2        |
| Operations | 1        |

## SECTION-D

34. (i) `import matplotlib.pyplot`  
 (ii) `plt.plot(Months, Rainfall, label='Rainfall')`  
 (iii) `plt.title('Monthly Rainfall')`  
 (iv) `plt.savefig('monthly_rainfall.png')`
34. (a) (i) `SELECT UPPER(Name) AS Name,  
UPPER(Category) AS Category  
FROM Product ORDER BY Price DESC;`  
 (ii) `SELECT ProdID, YEAR(Launch_Date) AS  
Launch_Year  
FROM Product;`  
 (iii) `SELECT SUM(Price) AS Total_Electronics_  
Price  
FROM Product WHERE Category =  
'Electronics';`  
 (iv) `SELECT SELECT Category, COUNT(*) AS  
Product_Count  
FROM Product GROUP BY Category;`

OR

(b) (i)

| Name         | LENGTH(Name) |
|--------------|--------------|
| Ramesh Kumar | 12           |
| Priya Singh  | 11           |

(ii)

| lower(Name)  |
|--------------|
| Ramesh kumar |

(iii)

| AVG (Salary) |
|--------------|
| 40           |

(iv)

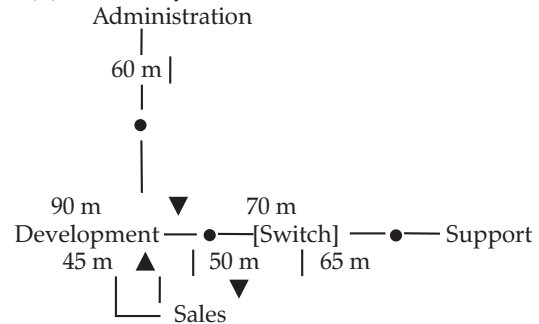
| Name        | Marks |
|-------------|-------|
| Priya Singh | 30    |
| Sneha Gupta | 35    |
| Karan Mehta | 40    |

## SECTION-E

35. (i) The server should be installed in the Sales department. Sales is the physical centroid of the four departments, with the shortest

average cable run (60 m to Administration, 50 m to Development, 70 m to Support).

(ii) Cable Layout



(iii) Switch

(iv) WAN(Wide Area Network)

(v) Repeater

36. (i) Last three rows  
`df_cars.tail(3)`  
 (ii) Add Credits column  
`df_cars['Credits'] = [120, 110, 130, 100, 125]`  
 (iii) Delete Credits column  
`df_cars.drop('Credits', axis=1, inplace=True)`  
 (iv) Rename price to rate  
`df_cars.rename(columns={'price': 'rate'}, inplace=True)`  
 (v) Display make and year  
`df_cars[['make', 'year']]`
37. (a) (i) `SELECT LEFT(dept_code, 3) FROM  
Departments;`  
 (ii) `SELECT COUNT(Invoice_ID) FROM  
Invoices;`  
 (iii) `SELECT DAY(payment_date) FROM  
Payments;`  
 (iv) `SELECT TRIM(State) FROM Locations;`  
 (v) `SELECT CURRENT_TIMESTAMP;`

OR

- (b) (i) `SELECT LENGTH('ComputerScience');`  
 (ii) `SELECT INSTR(Subject_Name, 's') FROM  
Subjects;`  
 (iii) `SELECT POWER(Fee, 2) FROM Courses;`  
 (iv) `SELECT AVG(Age) FROM Participants;`  
 (v) `SELECT SUM(Fee) FROM Courses;`

□□□

# Sample Question Paper-10

## SECTION-A

1. True  
*Explanation:* True. `reset_index()` reverts the DataFrame to its default integer index after a custom index has been set.
2. (a) 3  
*Explanation:* `MOD(3, 7)` returns the remainder of 3 divided by 7, which is 3.
3. (b) Hacking  
*Explanation:* This is Hacking, where someone gains unauthorized access to a digital account or system.
4. (b) `pd.read_csv('file.csv', nrows=100)`  
*Explanation:* `pd.read_csv('file.csv', nrows=100)` reads only the first 100 rows into a DataFrame.
5. (b) Switch  
*Explanation:* A Switch connects devices within a network and filters traffic using MAC addresses
6. (a) 0 decimal places  
*Explanation:* Defaults to rounding to 0 decimal places.
7. (c) Trademark  
*Explanation:* A Trademark protects logos, brand names, and symbols used for commercial identity.
8. (b) index  
*Explanation:* `index` returns the labels (index) of a Pandas Series.
9. (c) FullName (stored as FirstName + LastName)  
*Explanation:* FullName (FirstName + LastName) Because a composite key is formed by combining two or more columns together to uniquely identify a record.
10. (c) Unified Communications (Voice & Video)  
*Explanation:* Unified Communications integrates voice and video over IP, making it VoIP-based.
11. (b) `SUM(column_name)`  
*Explanation:* `SUM(column_name)` adds all non-NULL numeric values in the specified column
12. (c) Both numbers and labels  
*Explanation:* A Pandas Series can have a numeric index (like 0,1,2...) or custom labels (like names, dates, etc.) as its index.
13. (b) Certifying Authorities  
*Explanation:* The Controller of Certifying Authorities regulates digital signature providers.
14. (a) WHERE  
*Explanation:* The WHERE clause filters individual rows before any aggregation or grouping.
15. (a) `df.loc[1:4, ['A', 'C']]`  
*Explanation:* `df.loc[1:4, ['A', 'C']]` selects rows 1 to 4 (inclusive) and only columns A and C.
16. (a) Ring  
*Explanation:* Ring topology connects each node to two neighbors, forming a closed loop.
17. (b) It returns a specified number of characters from within a string starting at a given position.  
*Explanation:* Returns a specified number of characters from a string starting at a given position.
18. (b) `pandas.DataFrame.from_records([{'a':1}, {'a':2}])`  
*Explanation:* `pandas.DataFrame.from_records([{'a':1}, {'a':2}])` builds a DataFrame from a list of dicts.
19. (a) `ROUND()`  
*Explanation:* `ROUND()` is a scalar function used for formatting numbers, not aggregation.
20. (c) A is True, but R is False.  
*Explanation:* A is true, but R is false. `df.T` transposes the DataFrame, (transpose swaps rows and columns, not rotate visually.)
21. (a) Both A and R are True and R correctly explains A.  
*Explanation:* Both A and R are true, and R correctly explains A. SELECT is part of DML operations.

## SECTION-B

22. (a) An Index is an immutable array that labels the axis of a Series or DataFrame.  
One property of an Index is `is_unique`, a boolean that tells whether all labels in the index are unique.  
  
OR  
(b) All elements in a Series share the same data type (dtype).  
Different columns in a DataFrame can each have their own dtype.
23. E-waste refers to end-of-life electronic equipment.  
Open burning of cables and circuit boards releases dioxins and furans into the air contributing to respiratory problems and air pollution.

24. 

```
import pandas as pd
data = {
'id': [1, 2],
'name': ['Alice', 'Bob']
}
df = pd.DataFrame(data)
print(df)
```

25. (a) A URL (e.g., <https://example.com/page>) contains the protocol (HTTP/HTTPS), the domain and the resource path.

The browser first resolves the domain via DNS to an IP then opens a TCP connection to that IP and sends an HTTP request for the specified path. The web server at that IP returns the matching files.

OR

- (b) Web hosting is a service that stores websites on servers and makes them accessible on the internet. Example: Bluehost, HostGator, or GoDaddy.

26. (i) `SELECT DAYNAME('2025-01-05');`  
(ii) `SELECT UPPER('Incredible India');`

27. **Ethical hacking** is the practice of legally and responsibly testing computer systems, networks, or applications to identify and fix security vulnerabilities. It is performed with the permission of the system owner to improve cybersecurity.

**Difference from non-ethical hacking:**

Ethical hacking is done with authorization and aims to protect systems, while **non-ethical hacking** involves unauthorized access with malicious intent, such as stealing data or causing damage.

28. (a)

|   | EmpID | Pay   |
|---|-------|-------|
| 0 | 101   | 50000 |
| 1 | 102   | 60000 |
| 2 | 103   | 55000 |

OR

(b)

|   | Language | Creator           |
|---|----------|-------------------|
| 0 | Python   | Guido van Rossum  |
| 2 | C++      | Bjarne Stroustrup |

## SECTION-C

29. (i) Intellectual Property (IP) refers to creations of the mind such as literary works, inventions, etc.

Intellectual Property Rights (IPR) are legal rights granted to creators for their original work.

- (ii) ahul's invention will be covered under a patent.  
(iii) Inventors need strong Intellectual Property Rights (IPR) to protect their creations from being copied, to gain recognition, and to earn financial benefits.

30. (a) 

```
import numpy as np
import pandas as pd
marks = np.array([92, 85, 89, 90])
subjects = ['English', 'Art', 'Music', 'Drama']
s = pd.Series(marks, index=subjects)
print(s)
```

OR

(b) 

```
import pandas as pd
data = {
"Country": ["USA", "Canada", "Mexico"],
"Capital": ["Washington", "Ottawa", "Mexico City"]
}df = pd.DataFrame(data)
print(df)
```

31. (i) `CREATE TABLE STUDENTS (`  
`StudentID INTEGER PRIMARY KEY,`  
`FullName VARCHAR(40),`  
`DOB DATE,`  
`Grade CHAR(2)`  
`);`  
(ii) `INSERT INTO STUDENTS (StudentID,`  
`FullName, DOB, Grade)`  
`VALUES (501, 'Anjali Das', '2006-08-21', 'A+');`

32. (a) (i) `SELECT Class, COUNT(*) AS TotalStudents`  
`FROM STUDENT GROUP BY Class`  
`HAVING COUNT(*) > 1;`  
(ii) `SELECT Subject, Score FROM MARKS`  
`WHERE Score BETWEEN 75 AND 90;`  
(iii) `SELECT STUDENT.Name, MARKS.Subject,`  
`MARKS.Score`  
`FROM STUDENT`  
`JOIN MARKS ON STUDENT.StudentID =`  
`MARKS.StudentID`  
`ORDER BY MARKS.Score DESC;`

OR

- (b) (i) EmployeeID can be considered as Primary Key because it uniquely identifies each employee in the table.  
(ii) `ALTER TABLE Employee ADD Experience`  
`INT;`  
(iii)

| Department | COUNT(*) |
|------------|----------|
| IT         | 1        |
| Marketing  | 2        |
| Finance    | 2        |

## SECTION-D

33. (i) `import matplotlib.pyplot`  
 (ii) `plt.bar(Days, Sales, label='Sales')`  
 (iii) `plt.title('Daily Sales Report')`  
 (iv) `plt.savefig('daily_sales.png')`
34. (a) (i) `SELECT SELECT UPPER(Title) AS Title,  
UPPER(Genre) AS Genre  
FROM Book ORDER BY Price DESC;`  
 (ii) `SELECT BookID, YEAR(Publish_Date) AS  
Publish_Year  
FROM Book;`  
 (iii) `SELECT SUM(Price) AS Total_Education_  
Price FROM Book  
WHERE Genre = 'Education';`  
 (iv) `SELECT SELECT Genre, COUNT(*) AS  
Book_Count  
FROM Book GROUP BY Genre;`

OR

(b) (i)

| Name        | SUBSTR(Name,5) |
|-------------|----------------|
| Arjun Verma | n Verma        |
| Meera Joshi | a Joshi        |

(ii)

| lower(Name) |
|-------------|
| meera Joshi |

(iii)

| Average. Age |
|--------------|
| 37.0         |

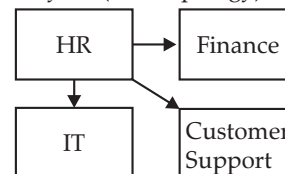
(iv)

| Name        | Age |
|-------------|-----|
| Meera Joshi | 32  |
| Neha Kapoor | 38  |

## SECTION-E

35. (i) The server should be installed in the HR department as it has the most number of computers.

(ii) Cable layout (Star Topology)



(iii) Switch/Hub

(iv) WAN (Wide Area Network)

(v) Repeater

36. (i) Last three rows  
`df_cars.tail(3)`  
 (ii) Add Mileage column  
`df_cars['Mileage'] = [15, 18, 12,  
10, 20]`

(iii) Delete Year column

`df_cars.drop('Year', axis=1,  
inplace=True)`

(iv) Rename Price to Cost

`df_cars.rename(columns={'Price':  
'Cost'}, inplace=True)`

(v) Display Make and Cost

`df_cars[['Make', 'Cost']]`

37. (a) (i) `SELECT LEFT(user_code, 6) FROM Users;`  
 (ii) `SELECT COUNT(Trans_ID) FROM  
Transactions;`  
 (iii) `SELECT YEAR(signup_date) FROM Users;`  
 (iv) `SELECT TRIM(Street) FROM Addresses;`  
 (v) `SELECT CURRENT_DATE();`

OR

- (b) (i) `SELECT LENGTH('Artificial Intelligence');`  
 (ii) `SELECT INSTR(Topic, 'I') FROM Seminars;`  
 (iii) `SELECT POWER(Duration, 2) FROM  
Sessions;`  
 (iv) `SELECT AVG(Rating) FROM Reviews;`  
 (v) `SELECT SUM(Rating) FROM Reviews;`

□□□