

MODEL TEST PAPER — 1 (SOLVED)

Time Allowed: 3 hrs

Maximum Marks: 70

General Instructions:

- Please check this question paper contains 37 questions.
- All questions are compulsory. However, internal choices have been provided in some questions. Attempt only one of the choices in such questions.
- The paper is divided into 5 Sections—A, B, C, D and E.
- Section A consists of 21 questions (1 to 21). Each question carries 1 Mark.
- Section B consists of 7 questions (22 to 28). Each question carries 2 Marks.
- Section C consists of 4 questions (29 to 32). Each question carries 3 Marks.
- Section D consists of 2 case study type questions (33 to 34). Each question carries 4 Marks.
- Section E consists of 3 questions (35 to 37). Each question carries 5 Marks.
- All programming questions are to be answered using Python language only.
- In case of MCQ, text of the correct answer should also be written.

Section A (21 × 1 = 21 Marks)

1. State whether the following statement is True or False: [1]
The index attribute of a DataFrame shows the row labels or indices.

Ans. True

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

```
SELECT DAY('2025-10-24');
```

- (a) 24 (b) 10
(c) Thursday (d) October

Ans. (a) 24

3. The main page of a website that users see first when they visit a site is called: [1]

- (a) Web page (b) Homepage
(c) URL (d) Link

Ans. (b) Homepage

4. Which of the following is not a numeric function in SQL? [1]

- (a) SUM() (b) AVG()
(c) LENGTH() (d) ROUND()

Ans. (c) LENGTH()

5. Ravi invented a new software algorithm and wants to protect his creation legally. Which type of intellectual property is suitable? [1]

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

Ans. (a) Patent

6. Which Pandas Series attribute returns the actual values stored in the series, sr? [1]

- (a) sr.index (b) sr.keys()
(c) sr.values (d) sr.items()

Ans. (c) sr.values

7. Which function in Matplotlib is used to display a bar chart? [1]

- (a) plot(kind="line") (b) bar()
(c) hist() (d) line()

Ans. (b) bar()

8. State whether the following statement is True or False: [1]
The aggregate function `SUM()` in SQL returns the total number of rows in a numeric column.

Ans. False

9. To access the first 5 rows of a DataFrame `df`, which method is used? [1]
(a) `df.tail()` (b) `df.head()`
(c) `df.first()` (d) `df.show()`

Ans. (b) `df.head()`

10. A person pretends to be someone else on social media to extract personal information. Which type of cybercrime is this? [1]
(a) Identity theft (b) Cyber bullying
(c) Phishing (d) Cyber terrorism

Ans. (c) Phishing

11. Which SQL function returns the largest integer less than or equal to a given number? [1]
(a) `FLOOR()` (b) `CEIL()`
(c) `ROUND()` (d) `MOD()`

Ans. (a) `FLOOR()`

12. Which protocol is used to transfer email securely from a server to a client? [1]
(a) SMTP (b) POP3
(c) FTP (d) HTTP

Ans. (b) POP3

13. Which function is used to display the first 'n' elements of a Pandas Series, `ser`? [1]
(a) `ser.top(n)` (b) `ser.start(n)`
(c) `ser.head(n)` (d) `ser.begin(n)`

Ans. (c) `ser.head(n)`

14. Ergonomics in computer usage deals with: [1]
(a) Computer programming techniques (b) Designing workplace for comfort and efficiency
(c) Internet security and privacy (d) Software installation

Ans. (b) Designing workplace for comfort and efficiency

15. Which of the following is a Python library used for data visualization? [1]
(a) `numpy` (b) `matplotlib`
(c) `pandas` (d) `csv`

Ans. (b) `matplotlib`

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

	Column-I		Column-II
P.	Text function	(i)	HAVING
Q.	Aggregate function	(ii)	INSTR()
R.	Clause	(iii)	CURDATE()
S.	Date function	(iv)	AVG()

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

Ans. (c) P-(ii), Q-(iv), R-(i), S-(iii)

17. Which of the following Python statements is used to add a new column to a DataFrame, `df`? [1]
(a) `df['new_col'] = values`
(b) `df.add_column('new_col', values)`
(c) `df.insert_column('new_col', values)`
(d) `df.append('new_col', values)`

Ans. (a) `df['new_col'] = values`

18. In Python Pandas, DataFrame . _____ displays the data type of each column. [1]
(a) types () (b) dtype ()
(c) dtypes (d) datatype ()

Ans. (c) dtypes

19. What is the main purpose of a web server? [1]
(a) To send emails (b) To store and deliver web pages
(c) To provide DNS services (d) To secure networks

Ans. (b) To store and deliver web pages

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

- (a) Both Assertion (A) and Reason (R) are True and Reason (R) is the correct explanation for Assertion (A).
(b) Both Assertion (A) and Reason (R) are True and Reason (R) is not the correct explanation for Assertion (A).
(c) Assertion (A) is True and Reason (R) is False.
(d) Assertion (A) is False but Reason (R) is True.

20. **Assertion (A):** The loc[] function is used for label-based indexing in Pandas. [1]
Reason (R): The iloc[] function is used for integer-location-based indexing in Pandas.

Ans. (a) Both Assertion (A) and Reason (R) are True and Reason (R) is the correct explanation for Assertion (A).

21. **Assertion (A):** The TRIM() function in SQL removes leading and trailing spaces from a string. [1]
Reason (R): TRIM() can also remove specified characters from a string.

Ans. (a) Both Assertion (A) and Reason (R) are True and Reason (R) is the correct explanation for Assertion (A).

Section B (7 × 2 = 14 Marks)

22. (a) Differentiate between iterrows() and items() in Python. [2]
Or

(b) What are the advantages of CSV file formats?

Ans. (a) <DataframeObject>.iterrows() iterates over horizontal subsets in the form of (row-index, series) pairs while <DataframeObject>.items() iterates over vertical subsets in the form of (col-index, series) pairs.

Or

(b) The advantages of CSV file formats are:

- (i) A simple, compact and universal format for data storage.
(ii) A common format for data interchange.
(iii) It can be opened in popular spreadsheet packages like MS Excel, Calc, etc.
(iv) Nearly all spreadsheets and databases support import/export to CSV format.

23. A small business wants to create a company website using open-source tools instead of paying for proprietary website builders. [2]

- (a) Identify one advantage of using open-source tools for the development of a company's website.
(b) Name any two open-source web development platforms or tools.

Ans. (a) Open-source tools are free to use, which reduces development costs for the company.
(b) Two open-source web development platforms/tools:

- (i) WordPress
(ii) Bootstrap

24. Consider the string "Neural Network and Analysis" and write suitable SQL queries for the following: [2]

- (a) To convert the string into lowercase and display the result.
(b) To display the last 9 characters of the string.

Ans. (a) SELECT LOWER('Neural Network and Analysis');

(b) SELECT RIGHT('Neural Network and Analysis', 9);

25. (a) Define network. Why is it needed? [2]

Or

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

Ans. (a) A network is an interconnected collection of autonomous computers that can share and exchange information.

A network is needed because of the following reasons:

- (i) Resource Sharing: Resources are shared by all computers over a network for effective utilization.
- (ii) Reduced Communication Cost: Sharing resources also reduces communication cost.

Or

(b) Bridge is a device designed to connect two LAN segments. The purpose of bridge is to filter traffic on a LAN. It relays frames between two originally separate segments. When a frame enters a bridge, the bridge not only regenerates the signal but also checks the physical address of the destination and forwards the new copy only to that port.

26. Define the degree and cardinality of a table. [2]

Ans. Degree is defined as the total number of columns in the table whereas cardinality is defined as the total number of rows in the table.

27. Describe measures to recycle e-waste safely. [2]

Ans. Recycling electronics helps decrease the strain on natural resources and the pollution caused by the production of a new product. It also minimizes the amount of energy consumed in the production of new products. The following measures can be adopted to recycle e-waste safely:

- (a) Give old electronics to certified e-waste recycler: Giving e-waste to a licensed e-waste recycler is the safest method to dispose it of. Recyclers of e-waste can also use it to create new products.
- (b) Sell your electronics: Sell old electronic items instead of throwing them away.
- (c) Donate to NGOs: When electronics are donated to NGOs, they are not only recycled but are also used to educate and open doors to new opportunities for many underprivileged people.

28. (a) The following code is intended to access the marks of Anu from the Series, but it contains an error. Rewrite the correct code and underline the corrections made. [2]

```
import pandas
marks=pd.Series([85, 90, 78, 92], index=["Jiya", "Anu", "Bhavik", "Ena"])
print(marks["Jiya"])
```

Or

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

	EMPLOYEE	AGE	SALARY
0	Alisha	25	50000
1	Charvi	30	60000
2	Sameer	28	55000

```
import _____ as pd
ages = [25, 30, 28]
employees = ['Alisha', 'Charvi', _____]
salaries = [50000, 60000, 55000]
data=pd.DataFrame({'EMPLOYEE': _____, 'AGE':ages, 'SALARY':salaries})
print(_____)
```

Ans. (a) `import pandas as pd`
`marks=pd.Series([85, 90, 78, 92], index=["Jiya", "Anu", "Bhavik", "Ena"])`
`print(marks["Anu"])`

Or

```
(b) import pandas as pd
ages = [25, 30, 28]
employees = ['Alisha', 'Charvi', 'Sameer']
salaries = [50000, 60000, 55000]
data = pd.DataFrame({'EMPLOYEE': employees, 'AGE': ages, 'SALARY':
salaries})
print(data)
```

Section C (4 × 3 = 12 Marks)

29. Anjum created a group chat for her classmates to discuss school projects. Some members started sending memes and offensive jokes that targeted other students. Anjum is unsure how to handle this situation and wants to make the group a safe and respectful space for everyone. [3]

- (a) What do you understand by responsible online behaviour?
- (b) Write any two net etiquette Anjum should promote in the group.
- (c) Suggest one way to deal with cyberbullying in online group chats.

Ans. (a) Responsible online behaviour means using the internet in a respectful, safe and ethical manner. It includes thinking before posting, respecting others' opinions, avoiding hurtful or offensive messages and maintaining a positive digital presence.

(b) Two net etiquette Anjum should promote in the group are:

- (i) Be polite and respectful while communicating—avoid using abusive or offensive language.
- (ii) Do not share or forward false information, memes or jokes that can hurt someone's feelings.

(c) One way to deal with cyberbullying in online group chats: Anjum can warn or remove members who share offensive content and report the incident to a teacher or trusted adult.

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

	Fruit	Price	Quantity
0	Apple	100	50
1	Banana	60	60
2	Grapes	80	40

Or

(b) Write a Python program to create a Pandas Series from an ndarray containing values 9.5, 8.2, 7.1, 5.8 and indices 'English', 'Economics', 'IP', 'Accountancy'.

English	9.5
Economics	8.2
IP	7.1
Accountancy	5.8

Ans. (a)

```
import pandas as pd
data = {
'Fruit': pd.Series(['Apple', 'Banana', 'Grapes']),
'Price': pd.Series([100, 60, 80]),
'Quantity': pd.Series([50, 60, 40])
}
df = pd.DataFrame(data)
print(df)
```

Or

```
(b) import pandas as pd
import numpy as np
marks = np.array([9.5, 8.2, 7.1, 5.8])
subjects = ['English', 'Economics', 'IP', 'Accountancy']
series = pd.Series(marks, index=subjects)
print(series)
```

31. (a) Write the SQL statement to create a table, Books with the following specifications: [3]

Table: BOOKS

Column Name	Data Type	Key
BookID	Integer	Primary Key
Title	Varchar(100)	
Author	Varchar(50)	
Price	Int	
Publisher	Varchar(40)	

- (b) Write the SQL query to display all the records of books which contain letter 'a' anywhere in the Title from the table Books.

Ans. (a) CREATE TABLE Books (
BookID INTEGER PRIMARY KEY,
Title VARCHAR(100),
Author VARCHAR(50),
Price INT,
Publisher VARCHAR(40)
);

(b) SELECT * FROM Books WHERE Title LIKE '%a%';

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

Table: STUDENTS

STU_ID	NAME	CLASS	YEAR_OF_ADMISSION
S101	Arnav Jindal	10	2022
S102	Rihana Gupta	12	2023
S103	Karan Joshi	11	2022
S104	Maya Chawla	12	2024
S105	Ishita Roy	10	2023

Table: FEE_RECORD

STU_ID	FEE_TYPE	AMOUNT
S101	Tuition Fee	25000
S102	Lab Fee	4000
S103	Sports Fee	3500
S104	Tuition Fee	27000
S105	Library Fee	1500

Write SQL queries for the following:

- To display the number of students admitted in each year.
- To find the average fee amount of students studying in class 10 or 11.
- To list the fee type and amount of all students.

Or

(b) Consider the following tables:

Table 1: CUSTOMERS

This table stores the basic details of the customers.

Customer_ID	Name	City
C401	Aarav Roy	Delhi
C402	Riya Sharma	Mumbai
C403	Karan Jain	Bangalore
C404	Sneha Das	Delhi
C405	Priya Mehta	Mumbai

Table 2: ORDERS

This table records the orders made by the customers.

Order_ID	Customer_ID	Product	Quantity	Price
O501	C401	Laptop	1	55000
O502	C402	Smartphone	2	25000
O503	C403	Headphones	3	6000
O504	C404	Tablet	1	18000
O505	C405	Monitor	1	10000

Write SQL queries for the following:

(i) To delete the orders from table ORDERS where Product is 'Headphones'.

(ii) To display the names of customers who live in Delhi.

(iii) To display customer names along with the product they ordered and the price.

- Ans. (a) (i) `SELECT YEAR_OF_ADMISSION, COUNT(*) FROM STUDENTS GROUP BY YEAR_OF_ADMISSION;`
(ii) `SELECT AVG (AMOUNT) FROM STUDENTS S, FEE_RECORD F WHERE S.STU_ID = F.STU_ID AND S.CLASS IN (10, 11);`
(iii) `SELECT FEE_TYPE, AMOUNT FROM FEE_RECORD;`

Or

(b) (i) `DELETE FROM ORDERS WHERE Product = 'Headphones';`

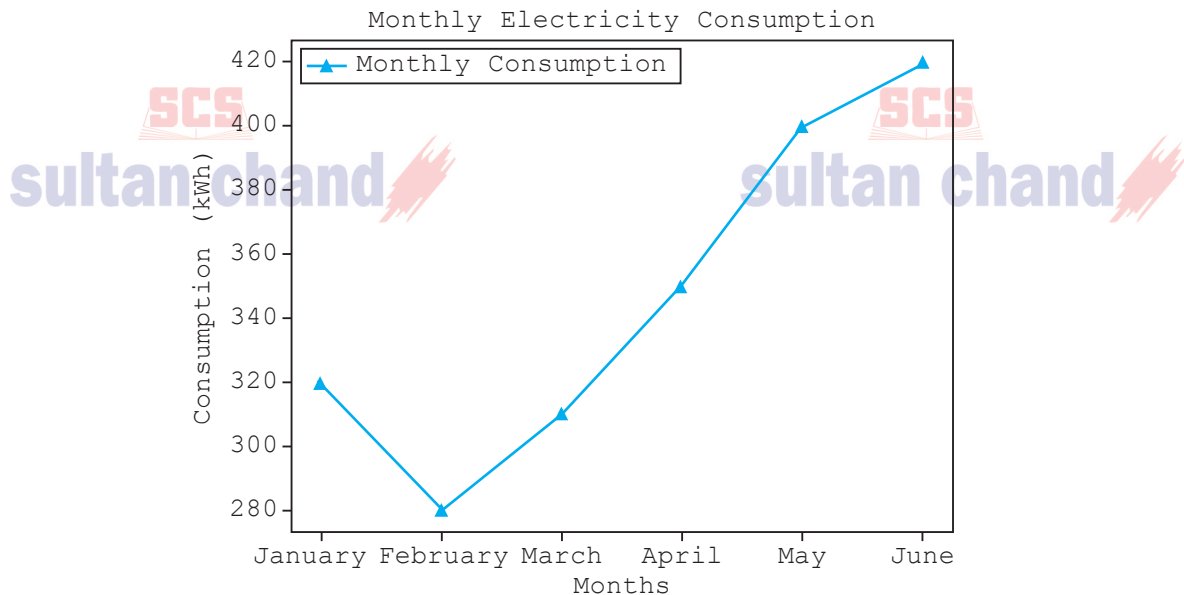
(ii) `SELECT Name FROM CUSTOMERS WHERE City = 'Delhi';`

(iii) `SELECT Name, Product, Price FROM CUSTOMERS C, ORDERS O WHERE C.Customer_ID = O.Customer_ID;`

Section D (2 × 4 = 8 Marks)

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

Month	Electricity Consumption (kWh)
January	320
February	280
March	310
April	350
May	400
June	420



```
import _____ as plt # Statement-1
months = ['January', 'February', 'March', 'April', 'May', 'June']
consumption = [320, 280, 310, 350, 400, 420]
plt.plot(months, _____, color='orange', marker='^', label='Monthly
Consumption') # Statement-2
plt.xlabel('_____') # Statement-3
plt.ylabel('Consumption (kWh)')
plt.legend()
plt.title('_____') # Statement-4
plt.show()
```

- Write the suitable code to import the required module in Statement-1.
- Fill in the blank in Statement-2 with a suitable Python code.
- Refer to the graph shown and fill in the blank in Statement-3 to display the appropriate label for the x-axis.
- Refer to the graph shown and fill in the blank in Statement-4 to display the suitable chart title.

Ans.

```
import matplotlib.pyplot as plt # Statement-1
months = ['January', 'February', 'March', 'April', 'May', 'June']
consumption = [320, 280, 310, 350, 400, 420]
plt.plot(months, consumption, color='orange', marker='^', label='Monthly
Consumption') # Statement-2
plt.xlabel('Months') # Statement-3
plt.ylabel('Consumption (kWh)')
plt.legend()
plt.title('Monthly Electricity Consumption') # Statement-4
plt.show()
```

- 34.** (a) A music academy keeps track of its students' payments using a table named STUDENT_FEES. The table has the following attributes: [4]
- STUDENT_ID:** Stores the unique ID for each student.
 - NAME:** Stores the student's name.
 - COURSE:** Stores the type of music course chosen (Vocal, Guitar, Piano, Violin).
 - JOIN_DATE:** Stores the date when the student joined.
 - FEES_PAID:** Stores the fees paid by the student.

Table: STUDENT_FEES

STUDENT_ID	NAME	COURSE	JOIN_DATE	FEES_PAID
S301	Aarohi Sharma	Vocal	2025-11-10	4000
S302	Rachita Singh	Guitar	2025-12-05	4500
S303	Manya Kansal	Piano	2025-12-20	5500
S304	Sakshi Chawla	Violin	2026-01-15	6000
S305	Ishaani Khurana	Vocal	2026-02-01	4800

Write SQL queries for the following:

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

STUDENT_ID: 'S306'
NAME: 'Yoshita Dixit'
COURSE: 'Piano'
JOIN_DATE: '2026-02-10'
FEES_PAID: 5200

- (ii) To display the name of the student who paid the maximum fees.
(iii) To display all students' names in lowercase.
(iv) To display the total fees collected from students having STUDENT_ID less than 'S304'.

Or

- (b) A travel agency maintains a database of its tour packages. The database includes a table named TOUR_PACKAGES whose attribute names are mentioned below:

PACKAGE_ID: Stores the unique ID for each package.

DESTINATION: Stores the name of the travel destination.

DURATION: Stores the number of days of the tour.

COST: Stores the total cost of the package.

MODE_OF_TRAVEL: Stores the mode of travel (Air, Train, Bus).

Table: TOUR_PACKAGES

PACKAGE_ID	DESTINATION	DURATION	COST	MODE_OF_TRAVEL
P501	Manali	5	18000	Bus
P502	Goa	7	30000	Air
P503	Jaipur	4	15000	Train
P504	Kerala	8	35000	Air
P505	Shimla	6	22000	Bus

Write the output of the following SQL queries:

- (i) SELECT DESTINATION, DURATION FROM TOUR_PACKAGES WHERE DURATION > 5;
(ii) SELECT LENGTH(DESTINATION) FROM TOUR_PACKAGES WHERE MODE_OF_TRAVEL = 'Train';
(iii) SELECT DESTINATION, COST FROM TOUR_PACKAGES WHERE COST BETWEEN 15000 AND 30000;
(iv) SELECT MIN(COST) FROM TOUR_PACKAGES;

- Ans. (a)** (i) INSERT INTO STUDENT_FEES VALUES ('S306', 'Yoshita Dixit', 'Piano', '2026-02-10', 5200);
(ii) SELECT NAME FROM STUDENT_FEES WHERE FEES_PAID = (SELECT MAX(FEES_PAID) FROM STUDENT_FEES);
(iii) SELECT LOWER(NAME) FROM STUDENT_FEES;
(iv) SELECT SUM(FEES_PAID) FROM STUDENT_FEES WHERE STUDENT_ID < 'S304';

Or

(b) (i)

DESTINATION	DURATION
Goa	7
Kerala	8
Shimla	6

(ii)

LENGTH (DESTINATION)
6

(iii)

DESTINATION	COST
Manali	18000
Goa	30000
Jaipur	15000
Shimla	22000

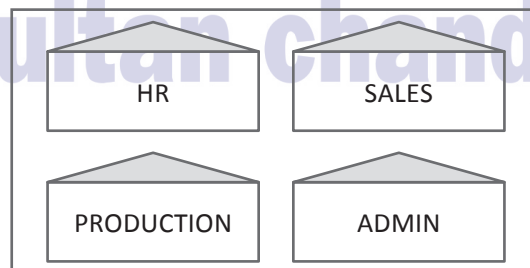
(iv)

MIN (COST)
15000

Section E (3 × 5 = 15 Marks)

35. Techno Nova Pvt. Ltd., Pune is a company that deals with web development and IT consulting projects. They have different divisions: **HR, SALES, PRODUCTION** and **ADMIN**. [5]

The layout of the Pune branch is:



The management wants to connect all the divisions as well as the computers of each division (HR, SALES, PRODUCTION and ADMIN).

Distance between the divisions are as follows:

HR to SALES	60 m
HR to PRODUCTION	85 m
HR to ADMIN	50 m
SALES to PRODUCTION	110 m
SALES to ADMIN	130 m
PRODUCTION to ADMIN	95 m

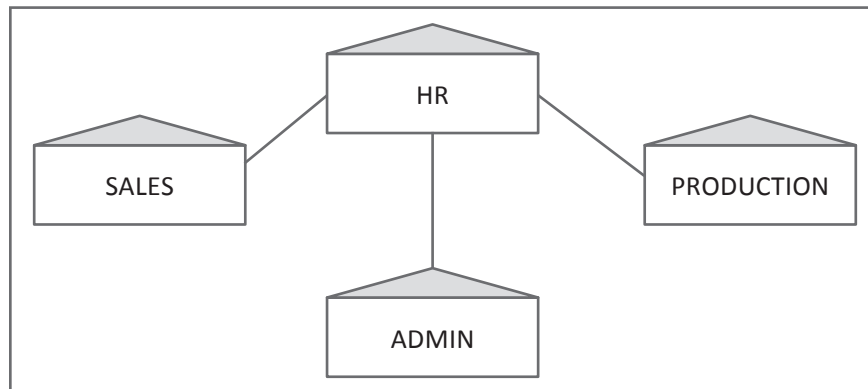
Number of computers in each division:

Division	Number of Computers
HR	25
SALES	70
PRODUCTION	160
ADMIN	30

Based on the given specifications, answer the following questions:

- Suggest the topology and draw the most suitable cable layout for connecting all the divisions in the Pune office.
- Techno Nova Pvt. Ltd. is having its head office in New York. Out of LAN, MAN and WAN, which kind of network will be created to connect the Pune office with the New York office? Justify your answer.
- Suggest the division for the placement of the server. Explain the reason for your selection.
- Suggest the placement of Switch/Hub with justification.
- Where will a repeater be placed in the suggested network layout? Justify your answer.

Ans. (a) Star topology.



- WAN will be created to connect Pune office with the New York office as distance is more than 50km.
- Production division is suitable for the placement of the server due to the presence of a maximum number of computers.
- The placement of the Switch/Hub in all the divisions to ensure efficient communication.
- In the suggested network layout, repeater will be placed between HR and PRODUCTION divisions as distance is more than 70m.

36. Consider the DataFrame `Patient` shown below:

[5]

	PID	Name	Department	Fee
0	201	Mr. Raj	CARDIO	2000
1	202	Ms. Tina	NEURO	2500
2	203	Mr. Arjun	ORTHO	2200
3	204	Ms. Kavya	DERMATO	1800
4	205	Mr. Sameer	NEURO	2400

Write suitable Python statements for the following:

- To print the first three rows of the DataFrame `Patient`.
- To display the names of all patients.
- To add a new column 'Insurance' with value 500 for all patients.
- To display rows with index 1 and 4.
- To delete the column 'Fee'.

Ans. (a) `print(Patient.head(3))`
 (b) `print(Patient['Name'])`
 (c) `Patient['Insurance'] = 500`
 (d) `print(Patient.loc[[1, 4]])`
 (e) `Patient.drop('Fee', axis=1, inplace=True)`

37. (a) Write SQL query for the following: [5]
- (i) To display the average salary from the SALARY column in the EMPLOYEES table.
 - (ii) To display the first four characters of the EMPLOYEE_NAME column from the EMPLOYEES table.
 - (iii) To display the EMPLOYEE_NAME column from the EMPLOYEES table after removing leading spaces.
 - (iv) To retrieve the minimum age from the AGE column of the EMPLOYEES table.
 - (v) To increase the salary of all employees by 10% in the EMPLOYEES table. (The column name is SALARY)

Or

- (b) Write SQL queries for the following:
- (i) To calculate the remainder when dividing 35 by 5.
 - (ii) To round the number 734.781 to the nearest integer.
 - (iii) To find the length of the string 'Data Analysis and AI'.
 - (iv) To display the month name for the date '2026-11-28'.
 - (v) To display the current date.

- Ans. (a) (i) `SELECT AVG (SALARY) FROM EMPLOYEES;`
(ii) `SELECT LEFT (EMPLOYEE_NAME, 4) FROM EMPLOYEES;`
(iii) `SELECT LTRIM (EMPLOYEE_NAME) FROM EMPLOYEES;`
(iv) `SELECT MIN (AGE) FROM EMPLOYEES;`
(v) `UPDATE EMPLOYEES SET SALARY = SALARY + SALARY * 0.1;`

Or

- (b) (i) `SELECT MOD (35, 5);`
(ii) `SELECT ROUND (734.781);` OR `SELECT ROUND (734.781, 0);`
(iii) `SELECT LENGTH ('Data Analysis and AI');`
(iv) `SELECT MONTHNAME ('2026-11-28');`
(v) `SELECT CURDATE ();`

Or

`SELECT DATE (NOW ());`

Or

`SELECT CURRENT_DATE ();`