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 a 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:

(i) To count number of students in each class.

(ii) Find the highest score and the corresponding subject.

(iii) 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

(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.

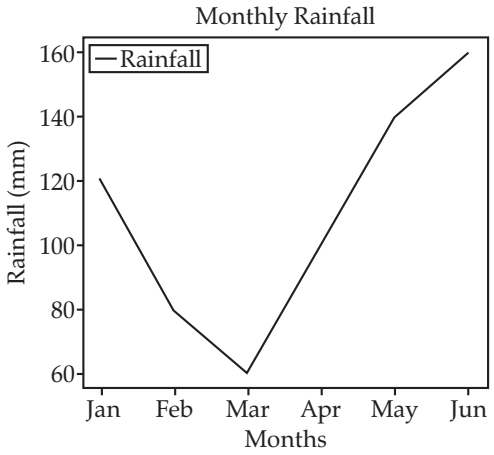
(iii) Write the output of the following SQL query.

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

SECTION-D

33. 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:

(i) Display the Name and Category in uppercase, sorted by Price in descending order.
(ii) Show ProdID and the year of the product launch.
(iii) Calculate the total price of all products in the Electronics category.
(iv) 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

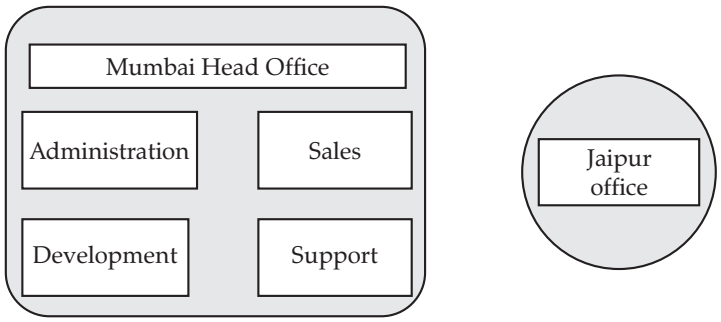
PatientID	Name	City	Age	Admit_Date
301	Ramesh Kumar	Delhi	45	2021-03-10
302	Priya Singh	Mumbai	30	2020-08-15
303	Anil Sharma	Kolkata	50	2022-02-01
304	Sneha Gupta	Delhi	35	2021-12-20
305	Karan Mehta	Mumbai	40	2020-05-05

Write the output of the following SQL queries.

(i) SELECT Name, LENGTH(Name) FROM Patient WHERE PatientID < 303;
(ii) SELECT LOWER(Name) FROM Patient WHERE MONTH(Admit_Date) = 3;
(iii) SELECT AVG(Age) AS Average_Age FROM Patient;
(iv) 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.

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