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:
(i) Extract 'Query' from the string.
(ii) 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.
(i) Identify the link between e-waste and water pollution.
(ii) Suggest an eco-friendly way the company could manage its outdated devices.
(iii) 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 Integer
Fee 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:

(i) List the names of employees from the IT department, sorted in ascending order.
(ii) Display the month names in uppercase where employees earned more than 60,000.
(iii) 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

(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 **StockQuantity** of numeric data type to the table.
(iii) 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:

(i) Display the **Name** and **Department** in lowercase, sorted in descending order of salary.
(ii) Display the **EmpID** and the **year** in which the employee joined.
(iii) Calculate and display the **highest salary** from the table.
(iv) 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

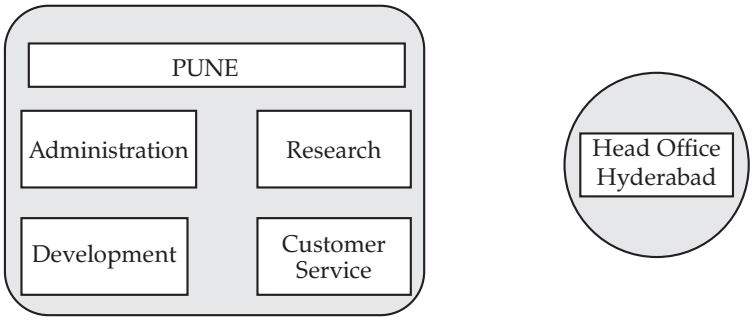
Write suitable SQL queries for the following:

(i) Show the **Title** and **Author** in uppercase, sorted alphabetically by Author name.
(ii) Display the **BookID** along with the month name of purchase.
(iii) Find and display the **average price** of all books.
(iv) 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.

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