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:

(i) What health hazard can this practice cause to humans or animals nearby?
(ii) Suggest a safer way to handle such damaged electronic components.
(iii) 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:

(i) Show subject-wise average score.

(ii) List all unique grades in descending order of score.

(iii) Display the student name with the subject they are studying. **[M] [3]**

(b) Consider the following table PRODUCT, which stores details of items available in a store.

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:

(i) Which attribute can be considered as the Primary Key? Give a reason.

(ii) Write an SQL query to increase the price of all "Electronics" items by 10%.

(iii) 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
```

(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 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

(i) Write an SQL query to display the names of all transporters without duplication.

(ii) Write an SQL query to show the total charges collected by each transporter.

(iii) Write an SQL query to display the average distance covered by buses, transporter-wise.

(iv) 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:

(i) select sum(MARKS) from student where OPTIONAL= 'IP' and STREAM= 'Commerce';

(ii) select max(MARKS)+min(MARKS) from student where OPTIONAL= 'CS';

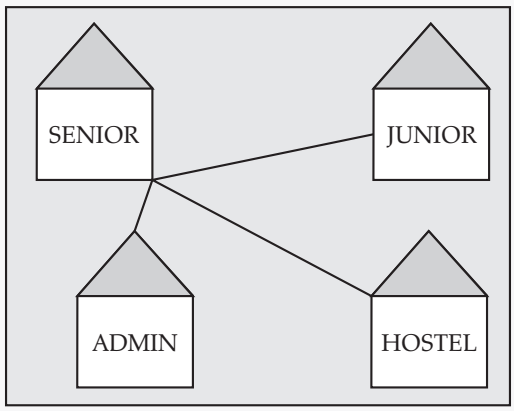
(iii) select avg(MARKS) from student where OPTIONAL= 'IP';

(iv) 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

(i) Draw the cable layout to efficiently connect various wings of the multi-purpose Public School, Bengaluru.
(ii) Name the most suitable wing where the Server should be installed. Justify your answer.
(iii) Suggest a device/software and its placement that would provide data security for the entire school network.
(iv) 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.
(v) 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:
(i) Display the first 3 rows of students_df.
(ii) Print all the names of the students.
(iii) Delete the column Marks.
(iv) Display the Name column for index 1 to 3.
(v) Change the column name Class to Standard. **[H] [5]**

37. **(a)** Write suitable SQL queries for the following:
(i) To display the total number of pages from the pages column in the Books table.
(ii) To extract the first five characters of the isbn_code column in the Books table.
(iii) To remove any extra spaces from the author_name column in the Authors table.
(iv) To find the highest price in the price column of the Books table.
(v) 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.

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