SAMPLE QUESTION PAPER (THEORY)
CLASS XII
INFORMATICS PRACTICES (065)

Time Allowed: 3 hrs **Maximum Marks: 70**

General Instructions:

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

Section A

1. State whether the following statement is True or False: [1]
The drop() method can be used to remove rows or columns from a Pandas DataFrame.

Ans. True

2. What will be the result of the following SQL query? [1]

```
SELECT MOD(5, 6);
```

(a) `3` (b) `5`
(c) `6` (d) `0`

Ans. (b) `5`

3. Shruti received an email that appeared to be from a popular social media platform, requesting her to click a link to reset her password. The link directed her to a fraudulent website designed to capture her login credentials. This situation is an example of which type of cybercrime? [1]

(a) Cyberbullying (b) Violation of Intellectual Property Rights
(c) Hacking (d) Phishing

Ans. (d) Phishing

4. Which of the following Python statements is used to write a Pandas DataFrame `df` to a CSV file? [1]

(a) `df.to_csv()` (b) `df.write_csv()`
(c) `df.to_table()` (d) `df.export_csv()`

Ans. (a) `df.to_csv()`

5. Which of the following devices is used for converting digital signals from a computer into analog signals for transmission over a telephone line? [1]

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

Ans. (a) Modem

6. What is the purpose of the `ROUND(num, 0)` in SQL, assuming num is a number with a fractional part? [1]

(a) Rounds the number to the nearest integer
(b) Always rounds the number up
(c) Leaves the number unchanged
(d) Always rounds the number down

Ans. (a) Rounds the number to the nearest integer

7. Aarushi has written a novel and wants to protect her literary work. Which type of Intellectual Property Right will help her do that? [1]

(a) Patent (b) Copyright

(c) Trademark (d) Both Copyright and Trademark

Ans. (b) Copyright

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

Ans. (d) Consecutive integers starting from 0

9. Consider a table named Students that has one primary key and three alternate keys. How many candidate keys does the table have? [1]

(a) 1 (b) 2

(c) 3 (d) 4

Ans. (d) 4

10. Which of the following is an application of VoIP technology? [1]

(a) Email (b) Chat

(c) Internet Telephony (d) Web Browsing

Ans. (c) Internet Telephony

11. Which of the following SQL functions is used to count the non-NULL values in a column named column_name? [1]

(a) `COUNT(*)` (b) `COUNT(column_name)`

(c) `SUM(column_name)` (d) `AVG(column_name)`

Ans. (b) `COUNT(column_name)`

12. When two Pandas Series with different indices are added, the result is _____. [1]

(a) Error occurs

(b) Indices are ignored and elements are added in order

(c) The result has all indices, with missing values filled as NaN

(d) Only the common indices are retained in the result

Ans. (c) The result has all indices, with missing values filled as NaN

13. In India, the primary law that deals with e-commerce and cybercrime is _____. [1]

(a) Cybercrime Prevention Act, 2000 (b) Digital Security Act, 2000

(c) Information Technology Act, 2000 (d) E-Commerce Regulation Act, 2008

Ans. (c) Information Technology Act, 2000

14. Which SQL command is used to sort rows in either ascending or descending order of values in a specific column? [1]

(a) `ORDER BY` (b) `SORT BY`

(c) `GROUP BY` (d) `SORT ON`

Ans. (a) `ORDER BY`

15. Which of the following Python commands selects the first 3 rows of a DataFrame `df`, assuming that labelled indices are consecutive integers starting from 0? [1]

(a) `df.loc[:3]` (b) `df.loc[:2]`

(c) `df.loc[0:4]` (d) `df.loc[1:4]`

Ans. (b) `df.loc[:2]`

16. In which network topology is every node directly connected to every other node? [1]

(a) Star (b) Tree

(c) Mesh (d) Bus

Ans. (c) Mesh

17. What is the use of the `INSTR()` function in SQL? [1]

(a) To replace characters in a string

(b) To find the length of a string

(c) To find the position of a substring in a string

(d) To extract characters from a string

Ans. (c) To find the position of a substring in a string

18. Which of the following Python statements creates an empty Pandas DataFrame? (Note: pd is an alias for pandas.) [1]

(a) `pd.DataFrame(None)` (b) `pd.DataFrame()`

(c) `pd.DataFrame([])` (d) `pd.DataFrame.empty()`

Ans. (b) `pd.DataFrame()`

19. Which of the following is NOT an aggregate function in SQL? [1]

(a) `MIN()` (b) `SUM()`

(c) `UPPER()` (d) `AVG()`

Ans. (c) `UPPER()`

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

(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.

20. **Assertion (A):** The output of `print(df)` and `print(df.loc[:])` will be same for a DataFrame `df`. [1]

Reason (R): The statement `print(df.loc[:])` will display all rows and columns of the DataFrame `df`, thus showing the entire data.

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

21. **Assertion (A):** The `INSERT INTO` command is a DML (Data Manipulation Language) command. [1]

Reason (R): DML commands are used to insert, update or delete the data stored in a database.

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

Section B

22. (a) What is a DataFrame in Pandas? Mention any one property of a DataFrame. [2]

OR

(b) List any two differences between Series and DataFrame in Pandas.

Ans. (a) A DataFrame is a two-dimensional labelled data structure with rows and columns.

Property: Flexible Size: Rows and Columns can be added or deleted after creation of a DataFrame.

OR

(b) A Series is one-dimensional, while a DataFrame is two-dimensional.

Series is size immutable, while a DataFrame is size mutable.

23. What is e-waste? Mention any one impact of e-waste on the environment. [2]

Ans. E-waste refers to discarded electronic devices like computers and phones.

Impact: E-waste releases toxic chemicals into the soil and water, harming the environment.

24. Ravi wants to create a Pandas Series as shown below: [2]

```
January     31
February    28
March       31
```

Help him in completing the code below to achieve the desired output.

(Note: `ser_data` is a dictionary.)

```
import _____ as pd
ser_data = _____
s = pd._____(ser_data)
print(s)
```

Ans.
```
pandas
{'January': 31, 'February': 28, 'March': 31}
Series
```

25. (a) Rohan, a Class XII student, has written code for a website but is unsure how to make it available on the internet. Explain to Rohan the role of a web server and web hosting in ensuring availability of his website on the internet. [2]

OR

(b) Explain the concept of VoIP and mention one benefit of using it.

Ans. (a) **Web Server:** It is a computer software that accepts client requests and responds with required content or an error message.

Web Hosting: It is a service that stores and maintains a website's files on a server so that the website is accessible online.

OR

(b) VoIP allows voice communication over the internet.

Benefit: Cost-effective

26. Write SQL queries to perform the following: [2]

(a) Display the name of the day (*e.g.*, Monday, Tuesday) for the date `'2026-01-01'`.

(b) Find and display the position of the substring `"India"` in the string `"Incredible India"`.

Ans. (a)
```
SELECT DAYNAME('2026-01-01');
```
(b)
```
SELECT INSTR('Incredible India', 'India');
```

27. Define digital footprints. Differentiate between active and passive digital footprints. [2]

Ans. Digital footprints are traces of a person's online activity.

Active Digital Footprint: Intentional posts or uploads.

Passive Digital Footprint: Unintentional data collected (*e.g.*, location tracking).

28. (a) Write the output of the following code: [2]
```
import pandas as pd
students = pd.Series(['Abhay', 'Ananya', 'Javed'])
marks = pd.Series([85, 92, 88])
data = {'Name': students, 'Marks': marks}
df = pd.DataFrame(data)
df.rename(columns={'Name': 'StuName', 'Marks': 'Score'}, inplace=True)
print(df)
```

OR

(b) Write the output of the following code:
```
import pandas as pd
states = pd.Series(['Maharashtra', 'Gujarat', 'Kerala'])
capitals = pd.Series(['Mumbai', 'Gandhinagar', 'Thiruvananthapuram'])
data = {'State': states, 'Capital': capitals}
df = pd.DataFrame(data)
df.drop(index=1, inplace=True)
print(df)
```

Ans. (a)

	StuName	Score
0	Abhay	85
1	Ananya	92
2	Javed	88

OR

(b)

	State	Capital
0	Maharashtra	Mumbai
2	Kerala	Thiruvananthapuram

Section C

29. Rahul has recently invented a new type of solar-powered water purification system and is concerned about the possibility of someone illegally copying and selling his invention without his permission. [3]

(a) Explain the terms Intellectual Property & Intellectual Property Rights (IPR).

(b) Under which specific category of IPR is Rahul's invention covered?

(c) Describe the importance of IPR in safeguarding innovations.

Ans. (a) Intellectual Property (IP) refers to creations of the mind like literary works, inventions, etc. Intellectual Property Rights (IPR) are legal rights granted to creators for their original work.

(b) Rahul's invention will be covered under Patent.

(c) Intellectual Property Rights (IPR) protect innovations by granting creators exclusive control over their inventions, preventing unauthorized use and ensuring financial rewards, which encourages further creativity and economic growth.

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. [3]

Mathematics	85
Science	90
English	78
History	88

OR

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

	Course	Duration
0	Data Science	12
1	Artificial Intelligence	18
2	Web Development	6

Ans. (a)
```
import pandas as pd
import numpy as np
marks = np.array([85, 90, 78, 88])
series = pd.Series(marks, index=['Mathematics', 'Science', 'English',
'History'])
print(series)
```

OR

(b)
```
import pandas as pd
d1 = {'Course': 'Data Science', 'Duration': 12}
d2 = {'Course': 'Artificial Intelligence', 'Duration': 18}
d3 = {'Course': 'Web Development', 'Duration': 6}
data = [d1, d2, d3]
df = pd.DataFrame(data)
print(df)
```

31. (a) Write an SQL statement to create a table named EMPLOYEES, with the following specifications: [2 + 1 = 3]

Column Name	Data Type	Key
EmployeeID	Numeric	Primary Key
EmpName	Varchar(25)	
HireDate	Date	
Salary_in_Lakhs	Float(4,2)	

(b) Write an SQL Query to insert the following data into the EMPLOYEES table: 101, 'Ravi Kumar', '2015-06-01', 1.70.

Ans. (a)
```
CREATE TABLE EMPLOYEES
(
EMPLOYEEID NUMERIC PRIMARY KEY,
EMPNAME VARCHAR(25),
HIREDATE DATE,
SALARY_IN_LAKHS FLOAT(4,2)
);
```

(b)
```
INSERT INTO EMPLOYEES VALUES (101, 'Ravi Kumar', '2015-06-01', 1.70);
```

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

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

StudentID	Name	Class
1	Ankit	12
2	Priya	11
3	Rohan	12
4	Shreya	11
5	Rehan	12

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

StudentID	Subject	Score
1	Mathematics	85
2	Physics	78
3	Chemistry	88
4	Biology	81
5	Computer Science	93

Write appropriate SQL queries for the following:

(i) List the names of students enrolled in Class 12, sorted in ascending order.

(ii) Display the names of all subjects in uppercase where students scored more than 80 marks.

(iii) Display the names of students along with their subject and score.

OR

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

Table: EMPLOYEE

EmployeeID	Name	Department	Salary
101	Aman	IT	60000
102	Rahul	HR	50000
103	Priya	IT	70000
104	Neha	Finance	55000
105	Rahul	IT	60000

(i) Which attribute in the Table can be considered as the Primary Key? Provide a 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;
```

Ans. (a) (i)
```
SELECT Name FROM STUDENT WHERE Class = 12 ORDER BY Name ASC;
```

(ii)
```
SELECT UPPER(Subject) FROM MARKS WHERE Score > 80;
```

(iii)
```
SELECT Name, Subject, Score FROM STUDENT S MARKS M WHERE
S.StudentID = M.StudentID;
```

OR

(b) (i) EmployeeID can be considered as the Primary Key because it uniquely identifies each employee in the table.

(ii) `ALTER TABLE Employee ADD Experience INT;`

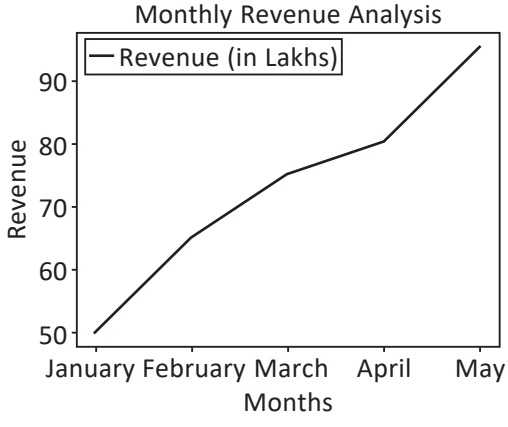
(iii)

Department	COUNT(*)
IT	3
HR	1
Finance	1

Section D

33. Rohan, a business analyst, is working on a Python program to create a line graph that represents the monthly revenue (in lakhs) of a company over five months. However, some parts of his code are incomplete. Help Rohan by filling in the blanks in the following Python program. [4]

Month	Revenue (in Lakhs)
January	50
February	65
March	75
April	80
May	95



Help Rohan to complete the code.

```
_____ as plt #Statement-1
Months = ['January', 'February', 'March', 'April', 'May']
Revenue = [50, 65, 75, 80, 95]
_____ #Statement-2
plt.xlabel('Months')
plt.ylabel('Revenue')
_____ #Statement-3
_____ #Statement-4
plt.legend()
plt.show()
```

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

(b) 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.

(c) Fill in the blank in Statement-3 with the correct Python code to set the title of the graph.

(d) Fill in the blank in Statement-4 with the appropriate Python code to save the graph as an image file named monthly_revenue.png.

Ans. (a) `import matplotlib.pyplot`

(b) `plt.plot(Months, Revenue, label='Revenue (in Lakhs)'`

(c) `plt.title('Monthly Revenue Analysis')`

(d) `plt.savefig('monthly_revenue.png')`

34. (a) Raghav, who works as a database designer, has created a table Student as shown below: [4]

Table: STUDENT

StudentID	Name	City	Marks	Admission_Date
101	Aarav Sharma	Delhi	85	2022-04-01
102	Priya Iyer	Mumbai	78	2021-05-15
103	Rohan Verma	Bangalore	92	2020-06-10
104	Simran Patel	Delhi	88	2022-03-20
105	Karan Yadav	Mumbai	75	2021-08-05

Write suitable SQL queries for the following:

(i) Show the Name and City of the students, both in uppercase, sorted alphabetically by Name.

(ii) Display the Student ID along with the name of the month in which the student was admitted to the school.

(iii) Calculate and display the average marks obtained by the students.

(iv) Show the names of the cities and the number of students residing in the city.

OR

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

Table: STUDENT

StudentID	Name	DateofBirth	Marks	City
301	Aryan	15-03-2005	80	Delhi
302	Ayesha	NULL	90	NULL
303	Aditi	NULL	85	Pune
304	Rajesh	11-01-2006	72	NULL
305	Maria	29-04-2005	95	Chennai

Write the output of the following SQL Queries:

(i) `SELECT Name, LENGTH(Name) FROM Student WHERE StudentID < 303;`

(ii) `SELECT lower(Name) FROM Student WHERE MONTH(DateofBirth)= 3;`

(iii) `SELECT AVG(Marks) FROM Student;`

(iv) `SELECT Name, Marks FROM Student WHERE Marks BETWEEN 90 AND 100;`

Ans. (a) (i) `SELECT UPPER(Name), UPPER(City) FROM Student ORDER BY Name;`

(ii) `SELECT StudentID, MONTHNAME(Admission_Date) FROM Student;`

(iii) `SELECT AVG(Marks)FROM Student;`

(iv) `SELECT City, COUNT(*) FROM Student GROUP BY City;`

OR

(b) (i)

Name	LENGTH(Name)
Aryan	5
Ayesha	6

(ii)

lower(Name)
aryan

(iii)

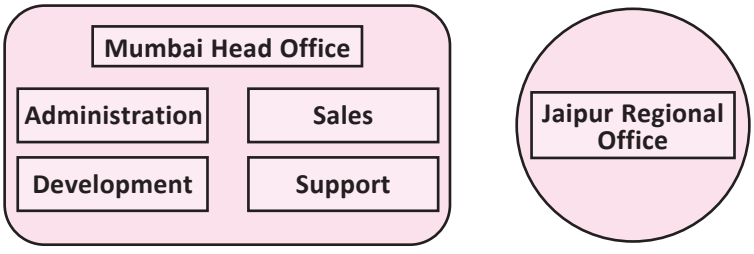
AVG(Marks)
84.4

(iv)

Name	Marks
Ayesha	90
Maria	95

Section E

35. ABC Pvt. Ltd. is a leading global IT solutions provider. The company's Head Office is located in Mumbai, while its Regional Office is in Jaipur. The Mumbai office consists of four departments: Administration, Sales, Development and Support. [5]



The distances between these departments, as well as between Mumbai and Jaipur, are as follows:

Administration to Sales	60 metres
Administration to Development	90 metres
Administration to Support	120 metres
Sales to Development	50 metres
Sales to Support	70 metres
Development to Support	45 metres
Mumbai Office to Jaipur Office	1400 kilometres

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

Administration	120
Sales	40
Development	70
Support	25
Jaipur Office	50

As a network engineer, you have to propose solutions for various queries listed from (a) to (e).

(a) Suggest the most suitable department in the Mumbai Office setup to install the server. Also, give a reason to justify your suggested location.

(b) Draw a suitable cable layout of wired network connectivity between the departments in the Mumbai Office.

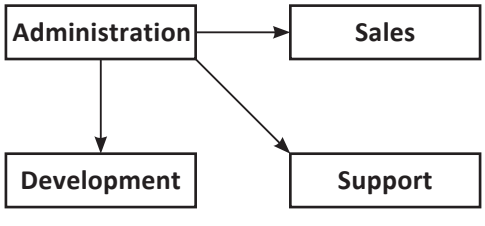
(c) Which hardware device will you suggest to connect all the computers within each department?

(d) Suggest the most appropriate type of network (LAN, MAN, WAN) to connect the Mumbai Office and Jaipur Regional Office.

(e) When a signal is transmitted through a wire from the Administration department to the Support department, its strength reduces. Which device would you suggest the company should use to solve this problem?

Ans. (a) The server should be installed in the Administration department as it has the most number of computers.

(b) Cable Layout



(c) Switch/Hub

(d) WAN (Wide Area Network), as the offices are located in different cities.

(e) Repeater

36. Consider the DataFrame `df` shown below. [5]

	Title	Department	Salary
0	Rohan Sharma	IT	75000
1	Meera Kapoor	HR	68000
2	Aarav Singh	Finance	85000
3	Nisha Singh	Marketing	72000
4	Aditya Verma	IT	80000

Write Python statements for the following tasks:

(a) Print the last three rows of the DataFrame `df`.

(b) Add a new column named `"Experience"` with values [5, 8, 10, 6, 7].

(c) Delete the column `"Salary"` from the DataFrame.

(d) Rename the column `"Department"` to `"Dept"`.

(e) Display only the `"Name"` and `"Salary"` columns from the DataFrame.

Ans. (a)
```
print(df.tail(3))
```
(b)
```
df['Experience'] = [5, 8, 10, 6, 7]
```
(c)
```
df.drop(columns=['Salary'], inplace=True)
```
(d)
```
df.rename(columns={'Department': 'Dept'}, inplace=True)
```
(e)
```
print(df[["Name", "Salary"]])
```

37. (a) Write a suitable SQL query for the following: [5]

(i) To extract the first five characters from the product_code column in the Products table.

(ii) To display the total number of orders from Order_Id column in the Orders table.

(iii) To display the year of the order dates from the order_date column in the Orders table.

(iv) To display the Address column from the Customers table after removing leading and trailing spaces.

(v) To display the current date.

OR

(b) Write a suitable SQL query for the following:

(i) To display the total number of characters in the string `'DatabaseSystems'`.

(ii) Find the position of the first occurrence of the letter `'a'` in the Product_Name column of the Products table.

(iii) Calculate the square of the Amount for each transaction in the Tran_Amount column of the Transactions table.

(iv) To display the average salary from the Salary column in the Employees table.

(v) Display the total sum of the Salary from the Salary column in the Employees table.

Ans. (a) (i)
```
SELECT LEFT(product_code, 5) FROM Products;
```
(ii)
```
SELECT COUNT(Order_Id) FROM Orders;
```
(iii)
```
SELECT YEAR(order_date) FROM Orders;
```
(iv)
```
SELECT TRIM(Address) FROM Customers;
```
(v)
```
SELECT DATE(NOW()); OR SELECT CURDATE();
```

OR

(b) (i)
```
SELECT LENGTH('DatabaseSystems');
```
(ii)
```
SELECT INSTR(Product_Name, 'a') FROM Products;
```
(iii)
```
SELECT POWER(Tran_Amount, 2) FROM Transactions;
```
(iv)
```
SELECT AVG(Salary) FROM Employees;
```
(v)
```
SELECT SUM(Salary) FROM Employees;
```