

DIRECTORATE OF EDUCATION, GOVT. OF NCT OF DELHI
MID TERM PRACTICE PAPER
CLASS XII
INFORMATICS PRACTICES (065)
Session: 2026-27

Time Allowed: 3 hours

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.

Q. No.	Section-A (21 x 1 = 21 Marks)	Marks
1.	State whether the given statement is True or False. The values in a primary key column must be strictly unique across all rows in the table.	1
2.	What are the primary two data structures provided by the Pandas library for data manipulation? (A) List and Dictionary (B) Vector and Matrix (C) Series and DataFrame (D) Array and Table	1
3.	Given a DataFrame df where the index contains custom string labels ['a', 'b', 'c', 'd'], which slice operation retrieves rows 'b' through 'd' inclusive? (A) df.loc['b':'d'] (B) df.iloc['b':'d'] (C) df.iloc[1:3] (D) df.loc['b':'c']	1

4.	A database administrator needs to generate a report of all products from the table <code>PRODUCT(ProdID, PName, Price)</code> where the price has not been specified (stored as NULL). Which SQL statement properly identifies these rows? (A) <code>SELECT * FROM PRODUCT WHERE Price = NULL;</code> (B) <code>SELECT * FROM PRODUCT WHERE Price = 'NULL';</code> (C) <code>SELECT * FROM PRODUCT WHERE Price == NULL;</code> (D) <code>SELECT * FROM PRODUCT WHERE Price IS NULL;</code>	1
5.	What happens if a developer tries to create a Series from a scalar value without providing an index argument, such as <code>pd.Series(50)</code>? (A) Creates a Series of length 1 with default integer index 0 (B) Creates an empty Series of length 0 (C) Raises a <code>ValueError</code> requiring an explicit index (D) Raises a <code>TypeError</code> due to missing parameters	1
6.	A database developer executes the following query in MySQL: <pre>SELECT MOD(29, 4);</pre> What value is returned by the query? (A) 4 (B) 1 (C) 7 (D) 0	1
7.	A data analyst executes the following code in Python: <pre>import pandas as pd s1 = pd.Series([10, 20, 30], index=['a', 'b', 'c']) s2 = pd.Series([5, 15, 25], index=['b', 'c', 'd']) result = s1 + s2</pre> Which index labels will have <code>NaN</code> as their value in result? (A) Only 'a' (B) Only 'd' (C) 'a' and 'd' (D) 'b' and 'c'	1
8.	When constructing a Pandas DataFrame from a dictionary of Series where the individual Series have different index labels, how does Pandas determine the resulting row index? (A) Default integer <code>RangeIndex</code> from 0 to N-1 (B) Union of all Series indices (C) Index of the first Series in the dictionary (D) Intersection of all Series indices	1
9.	State whether the given statement is True or False. In a DataFrame created using a dictionary of Series, the dictionary keys become the row labels of the DataFrame.	1
10.	Which method is used to display the last 'n' rows of a DataFrame df? (A) <code>df.last(n)</code> (B) <code>df.tail(n)</code> (C) <code>df.end(n)</code> (D) <code>df.bottom(n)</code>	1
11.	How do you display a single specific column named 'Marks' from a DataFrame df? (A) <code>df['Marks']</code> (B) <code>df.column('Marks')</code> (C) <code>df.select('Marks')</code> (D) <code>df.get_col('Marks')</code>	1

12.	What is the return type of the <code>MONTH()</code> function in MySQL? (A) A string containing the full month name (B) A date formatted with only month and year (C) A three-letter abbreviation of the month (D) An integer number from 1 to 12	1
13.	Which of the following is the standard syntax to add a new column named 'Grade' with a constant value 'A' to an existing DataFrame df? (A) <code>df('Grade') = 'A'</code> (B) <code>df['Grade'] = 'A'</code> (C) <code>df.new('Grade') = 'A'</code> (D) <code>df.add_column('Grade', 'A')</code>	1
14.	Which statement will display both 'Name' and 'Age' columns together from DataFrame df? (A) <code>df[['Name', 'Age']]</code> (B) <code>df['Name', 'Age']</code> (C) <code>df.display('Name', 'Age')</code> (D) <code>df('Name', 'Age')</code>	1
15.	Which parameter value must be set in <code>df.drop()</code> to indicate that a column is being deleted? (A) <code>axis=0</code> (B) <code>axis=1</code> (C) <code>axis=-1</code> (D) <code>axis=2</code>	1
16.	In DataFrame boolean indexing, what does the expression <code>df[df['Fee'] < 1000]</code> return? (A) A DataFrame containing only rows where 'Fee' is equal to 1000 (B) A single boolean Series with True and False values only (C) A list containing only the values of the 'Fee' column (D) A DataFrame containing only rows where 'Fee' is strictly less than 1000	1
17.	What value does <code>INSTR(string, substring)</code> return if the specified substring is NOT found inside the string? (A) 0 (B) False (C) -1 (D) NULL	1
18.	Which Matplotlib function is used to create a standard line plot? (A) <code>plt.line()</code> (B) <code>plt.plot()</code> (C) <code>plt.lines()</code> (D) <code>plt.draw_line()</code>	1
19.	Which attribute/indexer is specifically used for label-based indexing and selection in Pandas Series and DataFrames? (A) <code>.loc</code> (B) <code>.iloc</code> (C) <code>.index</code> (D) <code>.at_pos</code>	1

	Q-20 and Q-21 are Assertion (A) and Reason (R) Type questions. Choose the correct option as: (A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A) (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A) (C) Assertion (A) is True, but Reason (R) is False (D) Assertion (A) is False, but Reason (R) is True	
20.	Assertion (A): A Pandas Series is a one-dimensional array-like data structure. Reason (R): A Pandas DataFrame is a two-dimensional tabular data structure with labelled rows and columns.	1
21.	Assertion (A): The query <code>SELECT AVG(Score) FROM Exam;</code> calculates the average by dividing the sum of Score by the total count of non-null Score entries. Reason (R): The <code>AVG()</code> function automatically ignores NULL values and does not include them in the denominator count when calculating the average.	1
Q. No.	Section-B (7 x 2 = 14 Marks)	Marks
22.	A. Differentiate between a Pandas Series and a Pandas DataFrame based on dimensionality and data homogeneity. OR B. What happens when you create a Pandas Series from a Python dictionary and provide a custom index containing keys that do not exist in the dictionary? Explain with a short example.	2
23.	Given the following Python code to create, inspect, and index a Pandas Series, fill in the blanks as per the given directions: <pre>import pandas as pd score_dict = {'Amit': 95, 'Priya': 88, 'Rohan': 72, 'Sneha': 90} s = pd._____(score_dict) # Blank 1 top_scores = s._____(_____) # Blank 2, Blank 3 sneha_score = s[_____] # Blank 4</pre> Blank 1: Write the standard Pandas constructor function name used to convert the dictionary into a 1-dimensional labeled Series object. Blank 2: Write the method name used to fetch and view the beginning/top rows of a Series. Blank 3: Specify the integer argument needed inside the method to return exactly the first 3 records. Blank 4: Provide the exact string label required inside square brackets to extract the score for the student 'Sneha'.	2
24.	Predict the output of the following code: <pre>import pandas as pd s = pd.Series([100, 200, 300, 400], index=['p', 'q', 'r', 's']) print(s[1:3]) print(s['p':'r'])</pre>	2

25.	A. Differentiate between Single-Row (Scalar) Functions and Multiple-Row (Aggregate) Functions in SQL. Give one example of each. OR B. State the function of TRIM() in SQL. How does it differ from LTRIM() and RTRIM()	2												
26.	Find and correct the 4 syntax errors in the following Python code: <pre>import Pandas as pd data = [{'Name', 'Kumar', 'Marks': 85}, {'Name': 'Mohit', 'Marks': 92}] df = pd.DataFrame(data, index = ['S1', 'S2']) df['Grade'] = ['A', 'A+'] df.rename(columns = {'Marks': 'Scores'}, inplace = True print(df)</pre>	2												
27.	A. Differentiate between a Pandas Series and a Pandas DataFrame in terms of Value Mutability and Size Mutability. OR B. What is the purpose of a Legend in a Matplotlib plot? How is it added to a chart?	2												
28.	Fill in the blanks so that the code produces the desired output: <pre>import pandas as pd s1 = pd.Series([101, 102, 103, 104], index=['r1', 'r2', 'r3', 'r4']) s2 = pd._____(['A', 'B', 'A', 'C'], index=['r1', 'r2', 'r3', 'r4']) df = pd._____({'RollNo': s1, 'Grade': s2}) df['Passed'] = _____ print(df.tail(_____))</pre> Desired Output: <table><thead><tr><th></th><th>RollNo</th><th>Grade</th><th>Passed</th></tr></thead><tbody><tr><td>r3</td><td>103</td><td>A</td><td>True</td></tr><tr><td>r4</td><td>104</td><td>C</td><td>True</td></tr></tbody></table>		RollNo	Grade	Passed	r3	103	A	True	r4	104	C	True	2
	RollNo	Grade	Passed											
r3	103	A	True											
r4	104	C	True											
Section-C (4 x 3 = 12 Marks)														
29.	A. The school librarian wants to automate the inventory records for new reference books. As a database administrator, you are tasked with designing the relational structure and managing the initial dataset. I. Write a SQL query to create a table named BOOK_INVENTORY to store the book details with the following schema: BookID: Integer data type, uniquely identifies each book and acts as the Primary Key. Title: Character data type with a variable maximum length of 35 to store the book title. Category: Character data type with a variable maximum length of 20 to store the subject category. Price: Floating/Decimal numeric data type with precision (6,2) to record the purchase cost. II. The library recently procured a new dictionary. Write a SQL command to insert this record into the BOOK_INVENTORY table: BookID: 501, Title: 'Oxford English Dictionary'. Category: 'Reference'. Price: 650.00	2+1=3												

	OR B. An online retail store manages pending shipments in a backend database table named CUSTOMER_ORDER. I. Write a SQL query to create the table CUSTOMER_ORDER based on the following technical requirements: OrderID: Integer data type that uniquely identifies every purchase and serves as the Primary Key. CustomerName: Character data type with a variable maximum length of 30. OrderAmount: Floating/Decimal numeric data type with precision (8,2) to store the total bill value. OrderDate: Date data type to store when the transaction was completed. II. Due to a cancellation policy update, orders with an OrderAmount less than 250.00 need to be deleted from the active database. Write a SQL query to remove all such records.																					
30.	A traditional sweet shop (Mithai Bhandar) tracks its daily production and pricing using a Pandas DataFrame named df_sweets as shown below: <table><tr><th></th><th>SweetName</th><th>Price_per_kg</th><th>Stock_kg</th></tr><tr><td>S101</td><td>Gulab Jamun</td><td>320</td><td>25</td></tr><tr><td>S102</td><td>Rasgulla</td><td>300</td><td>40</td></tr><tr><td>S103</td><td>Kaju Katli</td><td>900</td><td>15</td></tr><tr><td>S104</td><td>Laddoo</td><td>240</td><td>50</td></tr></table> Write Python Pandas statements to perform the following operations: I. Add a new column named GST_Amount to the DataFrame, calculated as 5% of Price_per_kg. II. Rename the row index label S104 to S105 and column Stock_kg to Available_kg permanently in the original DataFrame. III. Delete the column Price_per_kg permanently from the DataFrame.		SweetName	Price_per_kg	Stock_kg	S101	Gulab Jamun	320	25	S102	Rasgulla	300	40	S103	Kaju Katli	900	15	S104	Laddoo	240	50	3
	SweetName	Price_per_kg	Stock_kg																			
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S103	Kaju Katli	900	15																			
S104	Laddoo	240	50																			
31.	A. A library tracks the number of copies available for different subjects. Write Python Pandas code to perform the following tasks: I. Create a Pandas Series named BookSeries using the following Python dictionary: book_data = {'Physics': 45, 'Chemistry': 38, 'Maths': 50, 'IP': 60} II. Display the top 2 subjects along with their book counts using a standard Pandas method. III. Access and display the number of books available for 'Chemistry' and 'Maths' using label-based slicing. OR B. Write Python Pandas code to perform the following tasks: I. Create a NumPy array from the list [85, 90, 78, 92] and construct a Pandas Series named ScoreSeries from this array with custom index labels ['Term1', 'Term2', 'Term3', 'Term4']. II. Display the last 3 term scores using the appropriate built-in Pandas function. III. Display the score obtained in 'Term3' using its index label.	3																				
32.	Explain the rules governing Positional Slicing versus Label-based Slicing in Pandas Series and DataFrames. Illustrate with an example for each.	3																				

	Section-D (2 x 4 = 8 Marks)																										
33.	Consider the following table EMPLOYEE and write SQL queries for parts (I) to (IV): TABLE:EMPLOYEE <table><tr><th>EmpID</th><th>EmpName</th><th>Salary</th><th>Commission</th><th>JoinDate</th></tr><tr><td>E101</td><td>Waris Sharma</td><td>75000.75</td><td>5000.50</td><td>2021-03-15</td></tr><tr><td>E102</td><td>Salman Verma</td><td>82000.40</td><td>6200.00</td><td>2020-11-20</td></tr><tr><td>E103</td><td>Divya Gupta</td><td>64000.85</td><td>4500.25</td><td>2022-07-08</td></tr><tr><td>E104</td><td>Sunil Rao</td><td>91000.20</td><td>7800.75</td><td>2019-01-25</td></tr></table> I. Display the EmpName and the Salary rounded off to one decimal place for all employees. II. Display the EmpName in uppercase. III. Display the EmpName, the full name of the month of JoinDate for all employees who joined in the year 2021 or later. IV. Display the EmpName and the numeric position of the first space character ' ' present in the EmpName column.	EmpID	EmpName	Salary	Commission	JoinDate	E101	Waris Sharma	75000.75	5000.50	2021-03-15	E102	Salman Verma	82000.40	6200.00	2020-11-20	E103	Divya Gupta	64000.85	4500.25	2022-07-08	E104	Sunil Rao	91000.20	7800.75	2019-01-25	4
EmpID	EmpName	Salary	Commission	JoinDate																							
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E103	Divya Gupta	64000.85	4500.25	2022-07-08																							
E104	Sunil Rao	91000.20	7800.75	2019-01-25																							
34.	A. Consider the following code: import pandas as pd p = pd.Series(50, index=['w', 'x', 'y', 'z']) q = pd.Series({'x': 10, 'y': 20, 'z': 30}) Write the output for: I. print(p[1:3]) II. print(p['x'] - q['x']) III. print((p + q)['w']) IV. print(q.tail(1)) OR B. Consider the following code: import numpy as np import pandas as pd arr = np.array([12, 24, 36, 48]) s1 = pd.Series(arr, index=['K1', 'K2', 'K3', 'K4']) s2 = pd.Series({'K2': 6, 'K3': 12, 'K5': 20}) Write the output produced by each of the following statements: I. print(s1['K2'] // s2['K2']) II. print(s1[0:2]) III. print((s1 - s2)['K4']) IV. print(s2.head(1))	4																									
	Section-E (3 x 5 = 15 Marks)																										
35.	Consider the following Table: Student and write outputs of the SQL queries that follow: Table: Student <table><tr><th>RollNo</th><th>SName</th><th>Marks</th><th>Stream</th><th>DOB</th></tr><tr><td>101</td><td>AYUSH MEHRA</td><td>85</td><td>Science</td><td>2008-05-14</td></tr><tr><td>102</td><td>SUMIT VERMA</td><td>92</td><td>Commerce</td><td>2007-11-20</td></tr><tr><td>103</td><td>KARAN ROY</td><td>NULL</td><td>Humanities</td><td>2008-01-05</td></tr><tr><td>104</td><td>HARSH DAS</td><td>78</td><td>Science</td><td>2007-08-12</td></tr></table>	RollNo	SName	Marks	Stream	DOB	101	AYUSH MEHRA	85	Science	2008-05-14	102	SUMIT VERMA	92	Commerce	2007-11-20	103	KARAN ROY	NULL	Humanities	2008-01-05	104	HARSH DAS	78	Science	2007-08-12	5
RollNo	SName	Marks	Stream	DOB																							
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	I. SELECT POWER(2, 4); II. SELECT MID(SName, 1, 5), LENGTH(Stream) FROM STUDENT WHERE RollNo = 101; III. SELECT RIGHT(SName, 3), DAYNAME(DOB) FROM STUDENT WHERE RollNo = 102; IV. SELECT YEAR(DOB)FROM STUDENT WHERE RollNo = 104; V. SELECT COUNT(*), COUNT(Marks) FROM STUDENT;																
36.	Fill in the blanks to generate the complete chart as shown: <table border="1"> <caption>Data for Annual Inter-House Sports Tally</caption> <thead> <tr> <th>House</th> <th>Term 1 Medals</th> <th>Term 2 Medals</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td>12</td> <td>15</td> </tr> <tr> <td>Blue</td> <td>18</td> <td>20</td> </tr> <tr> <td>Green</td> <td>15</td> <td>18</td> </tr> <tr> <td>Yellow</td> <td>22</td> <td>25</td> </tr> </tbody> </table> <pre> import matplotlib.pyplot as plt houses = ['Red', 'Blue', 'Green', 'Yellow'] term1_medals = [12, 18, 15, 22] term2_medals = [15, 20, 18, 25] I. plt._____(houses, term1_medals, color='blue', label='Term 1') II. plt.plot(houses, _____, color='green', label='Term 2') III. plt._____('Houses') plt.ylabel('Total Medals') IV. plt._____('Annual Inter-House Sports Tally') V. plt._____() plt.show() </pre>	House	Term 1 Medals	Term 2 Medals	Red	12	15	Blue	18	20	Green	15	18	Yellow	22	25	5
House	Term 1 Medals	Term 2 Medals															
Red	12	15															
Blue	18	20															
Green	15	18															
Yellow	22	25															

37.	A. Consider the following Python code: <pre>import pandas as pd book_data = [{'Title': 'Python Core', 'Price': 450, 'Stock': 20}, {'Title': 'SQL Mastery', 'Price': 380, 'Stock': 35}, {'Title': 'Data Science', 'Price': 620, 'Stock': 15}, {'Title': 'Web Basics', 'Price': 290, 'Stock': 40}] df = pd.DataFrame(book_data, index=['B1', 'B2', 'B3', 'B4']) df['Discount'] = 50 df.rename(columns={'Price': 'Cost'}, inplace=True)</pre> Write the output produced by each of the following statements: <code>print(df.loc['B2', 'Cost'])</code> <code>print(df.head(1)['Title'])</code> <code>print(df.loc['B3', 'Cost'])</code> <code>print(df[df['Stock'] > 35])</code> <code>print(df.drop('B1', axis=0))</code> OR B. Consider the following Python code: <pre>import pandas as pd s_emp = pd.Series(['Aman', 'Kavita', 'Rajat', 'Neha'], index=['E1', 'E2', 'E3', 'E4']) s_dept = pd.Series(['HR', 'IT', 'Finance', 'IT'], index=['E1', 'E2', 'E3', 'E4']) s_leave = pd.Series([2, 5, 1, 4], index=['E1', 'E2', 'E3', 'E4']) df_emp = pd.DataFrame({'Name': s_emp, 'Dept': s_dept, 'Leaves': s_leave})</pre> Write the output produced by each of the following statements: <code>print(df_emp.loc['E3', 'Dept'])</code> <code>print(df_emp.tail(1)['Name'])</code> <code>print(df_emp.iloc[1, 2] + 2)</code> <code>print(df_emp[df_emp['Dept'] == 'IT'])</code> <code>print(df_emp.drop('E4', axis=0))</code>	5
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