Roll No:
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# St. Claret College

## Autonomous, Bengaluru

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**UG END SEMESTER EXAMINATION-NOV 2025**
**B.Sc. 1 SEMESTER**
**AIML 125: FOUNDATIONS OF PROGRAMMING WITH PYTHON**

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**TIME: 3 hours.** **MAX. MARKS: 80**

**This paper contains FOUR printed pages and FOUR parts**

**Instructions:**
1. **Verify and ensure that the question paper is completely printed.**
2. **Any discrepancies or questions about the exam paper must be reported to the COE within 1 hour after the examination.**
3. **Students must check the course title and course code before answering the questions.**

**PART-A**

**Answer ALL questions. Each answer carries ONE mark.** **[ 1 x 10 = 10]**

1. Which of the following is the **invalid** variable name in Python?
   a. 2num b. num_2 c. _num d. num_
2. What is the output of the following code?

```
x = 10.0
print(type(x))
```

   a. Float b. Int c. String d. Bool
3. Which operator is considered as assignment operator in Python?
   a. * b. == c. = d. %
4. What is the correct syntax for an if statement in Python?
   a. if x > 5: b. if (x > 5) c. if x > 5 d. if: x > 5
5. What will be the output of the following code?

```
x = 10
if x > 5:
    print("A")
else:
    print("B")
```

   a. A b. B c. AB d. No output
6. Which statement is kept in the empty blocks to avoid the error?
   a. break b. Continue c. Pass d. skip

7. What is the name of the constructor method in Python?
   a. __init__()  b. __construct__()  c. __start__()  d. display_init()
8. Which of the following statements is true about class and instance variables?
   a. Class variables are specific to each object
   b. Instance variables are shared by all objects
   c. Class variables are shared by all objects
   d. Both are the same
9. Which function is used to create a NumPy array?
   a. array()  b. np.array()  c. numpy.create()  d. np.list()
10. In Pandas, what does df.head() do?
   a. Displays the last 5 rows of a Data Frame
   b. Displays the first 5 rows of a Data Frame
   c. Displays the column names
   d. Displays summary statistics

## PART-B

**Answer any TEN questions. Each answer carries TWO marks.** **[ 2 x 10 = 20]**

11. Define a variable in Python. Give an example with proper data type.
12. What is type casting? Convert an integer x = 10 into float and string.
13. Write two differences between List and Tuple.
14. What is the purpose of the if statement in Python?
    Write a program to check if a number is negative.
15. Write a while loop to print the first 5 natural numbers.
16. Use filter () to select only even numbers from a list. List1 = [1,2,3,4,5]
17. Explain __init__() role in the class with an example
18. What is the purpose of the try-except block? Write a short program to handle division by zero.
19. Explain the role of "self" parameter in the __init__() method.
20. Create a 2x3 NumPy array of zeros and ones.
21. Create a Data Frame with columns Name and Age for 3 students.
22. Perform filtering to select rows where Age > 20.

## PART-C

**Answer any FOUR questions. Each answer carries FIVE marks.** **[5 x 4 = 20]**

23. Write a Python program to:
   a. Take two integer inputs from the user, a and b.
   b. Perform and display the results of addition, subtraction, multiplication, division.
   c. Compare the two numbers using >, <, ==, != and print the results.
24. Write a Python program to check negative and positive numbers in the list [5, -2, 7, -9, 0, -1] using "for loop". Explain the logic.
25. What is an argument in the function? Mention any 3 types with an example each.
26. Describe the primary difference between class and instance variables. Create a small program to illustrate the difference.

27. Explain the below pandas functions

a. Shape b. head() c. tail() d. info () e. describe()

28. Consider the array

```
array([[1, 2, 3],
       [4, 5, 6],
       [7, 8, 9]])
```

a. Print the last row.
b. Print the first column.
c. Calculate min, max element of the array.
d. Find the size and shape of the array.
e. Reshape the array

## PART-D

**Answer any THREE questions. Each answer carries TWO marks.** **[ 10 x 3= 30]**

29. Write a Python program to demonstrate the use of various List methods. Perform the following tasks step by step:

a. Create a list numbers = [2, 4, 6, 8, 10,10]. (2M)
b. Add the element 30 at the end of the list. (1M)
c. Insert the element 12 at the 3rd position. (1M)
d. Add multiple elements [20,25]. (1M)
e. Delete the last element. (1M)
f. Count how many times 10 appears in the list. (1M)
g. Find the index of the element 20. (1M)
h. Sort the list in ascending order. (1M)
i. Reverse the list. (1M)

30. Answer the following sub-questions.

a. Write a lambda function to add two numbers and display the sum. (2M)
b. Use map() with a lambda function to create a new list containing the square of each number in the list. (2M)
c. Use filter() with a lambda function to extract only odd numbers from the list. (2M)
d. Use filter() with a lambda function to get all numbers less than 5 in the list . (2M)
e. Use reduce() with a lambda function to find the product of all numbers in the list. (2M)

31. What is Inheritance? State the difference between Multilevel and Multiple inheritance with an example.

32. Discuss the various array operations available in NumPy with examples.
    a. Why NumPy arrays are considered over list? (2M)
    b. Aggregation functions. (2M)
    c. Manipulation operations – Transpose. (2M)
    d. Creation of arrays using arange().(2M)
    e. Creation of arrays using linspace().(2M)

33. 1. What are Pandas Data Frames? (2M)
    2. Consider the below dataset and answer the questions

| StudentID | Name | Age | Gender | Department | Marks | Passed |
|---|---|---|---|---|---|---|
| 101 | Alice | 20 | F | CS | 85 | Yes |
| 102 | Bob | 21 | M | EE | 72 | Yes |
| 103 | Charlie | 19 | M | CS | 65 | No |
| 104 | Diana | 22 | F | ME | 90 | Yes |
| 105 | Ethan | 20 | M | EE | 55 | No |

    a. Retrieve the columns "Name and Age" from the data frame. (2M)
    b. Display the last 2rows Data Frame. (2M)
    c. Find those students who have scored marks greater than 80. Display the name and marks columns. (2M)
    d. Add a new column Grade based on marks: (2M)

        - Marks >= 85 -> "A"
        - Marks >= 70 and < 85 -> "B"
        - Marks < 70 -> "C"