

Roll No:

Date: \_\_/\_\_/\_\_

# St. Claret College

Autonomous, Bengaluru

UG END SEMESTER EXAMINATION-NOV 2025

BCA 1 SEMESTER

CA 1425: Basics of AI, ML & 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.

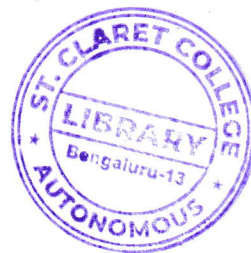
**PART-A**

Answer **ALL** questions. Each answer carries **ONE** mark.

[ 1 x 10 = 10]

1. Which of the following is an example of an uninformed search algorithm?  
a. A\* search                      b. Best First Search      c. Breadth First Search      d. AO\* search
2. Which of the following is an example of AI bias?  
a. AI program predicting results accurately decisions      b. AI system favoring one gender in hiring  
c. AI system running faster on new hardware      d. AI system trained on large datasets
3. The term features in Machine Learning refers to:  
a. Output                      b. Input                      c. Number of models used      d. Accuracy of the model
4. Which of the following is an evaluation metric used for classification problems?  
a. Feature Scaling              b. Gradient Descent      c. Accuracy                      d. R2 Score
5. In Logistic Regression, the output is:  
a. Continuous                      b. Discrete/Categorical      c. Always zero                      d. Text-based output
6. Which of the following is the **valid** variable name in Python?  
a. num                      b. 2num                      c. num&                      d. num\_num#
7. What will be the output of the following code?

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



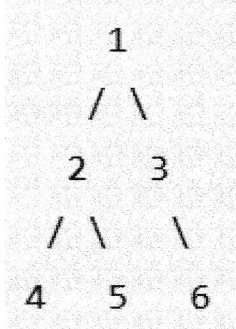
- a. A                      b. B                      c. AB                      d. Error
8. The break statement is used to:  
 a. Stop only the current iteration    b. Exit the loop    c. Pause the loop    d. Restart the loop
9. Which keyword is used to define a function in Python?  
 a. Func                      b. define                      c. def                      d. function
10. Which of the following is a correct way to create a string in Python?  
 a. text = "Hello"                      b. text = Hello                      c. string text = 'Hello'                      d. text == "Hello"

**PART-B**

Answer any **FIVE** questions. Each answer carries **TWO** marks.

[2x 5= 10]

11. The following graph represents connections between nodes:



Starting from node 1, write the Breadth First Search (BFS) order of traversal.

12. A dataset contains Patient symptoms (X) and diagnosis (Y).  
 The goal is to predict the disease based on new patient symptoms. Identify the type of Machine Learning and explain.
13. Give one real-life example where Linear Regression would be suitable and explain briefly.
14. What is a variable? State the rules of naming a variable.
15. What is the purpose of the “if” statement in Python?  
 Write a program to check if a number is negative.
16. Define function. Give an example for “function with parameter and with return value”.
17. Write a while loop to print the first 5 natural numbers.

**PART-C**

Answer any **FOUR** questions. Each answer carries **FIVE** marks.

[5 x 4 = 20]

18. Differentiate between Informed Search and Uninformed Search strategies in Artificial Intelligence with suitable examples.
19. A Decision Tree model was tested on the following data:

Actual(y)	Predicted(y_pred)
1	1
0	0
1	0

1	1
0	0
0	1
1	1
0	0

- a. Construct the confusion matrix for this data. (2M)
- b. Calculate Precision, Recall, and F1 Score. (3M)

20. The following dataset contains Study Hours and Sleep Hours of students along with their Exam Result (Pass/Fail):

Instance	Study Hours	Sleep Hours	Result
1	2	8	Fail
2	4	6	Pass
3	1	9	Fail
4	3	7	Pass

A new student studies 3.5 hours and sleeps 6.5 hours (new data points).

Using  $k = 3$  and Euclidean distance, determine whether the student is likely to Pass or Fail.

Show all distance computations and majority voting step.

21. a. What are operators in Python? List the different types of operators. (2 M)
- b. Write a Python program to demonstrate the use of the following operators: (3 M)  
Arithmetic, Relational, Logical, Assignment.
22. a. Explain the difference between the break and continue statements in Python loops. (2M)
- b. Write a Python program that prints numbers from 1 to 10, but skips multiples of 3 and stops the loop if the number is greater than 8. (3M)
23. What are arguments in functions? Explain any two with an example each.

#### PART-D

Answer any **FOUR** questions. Each answer carries **TEN** marks.

[10x 4 =40]

24. Define the term heuristic value in the context of Artificial Intelligence. Explain its importance in problem-solving and search strategies. (3M)

Consider the following 8-puzzle problem:

<b>Initial State:</b>	<b>Goal State:</b>
1 2 3	1 2 3
4 _ 6	4 5 6
7 5 8	7 _ 8

Using the misplaced tiles heuristic ( $h$  = number of misplaced tiles), calculate the heuristic value for the start state and show step by step analysis followed to reach the goal state. (7M)

25. a. Explain the working of Linear Regression with a suitable example. (4 M)  
b. State the default optimizer used for training Linear Regression models. (2 M)  
c. Describe in detail the relation between loss function and weights, and explain how the optimizer works. (4 M)
26. a. Define keywords and identifiers in Python. Write the code snippet for printing the keywords? Give examples of valid and invalid identifiers. (5 M)  
b. Write a Python program that reads marks of a student in three subjects and prints the grade according to the following rules using if-elif-else:
  - Average  $\geq 90$   $\rightarrow$  Grade A
  - Average  $\geq 75$   $\rightarrow$  Grade B
  - Average  $\geq 60$   $\rightarrow$  Grade C
  - Average  $< 60$   $\rightarrow$  Grade D (5 M)
27. a. Explain the different types of control flow statements in Python (if, if-else, if-elif-else, nested if). Give the syntax and explain how Python uses indentation to define code blocks. (5 M)  
b. Write a Python program that accepts three numbers from the user and displays the largest number using if-elif-else. (5M)
28. Write a Python program to:
  - a. Create a string "Artificial Intelligence".
  - b. Convert the string into lowercase.
  - c. Count and display the number of vowels in the string.
  - d. Display whether the string ends with "ence" or not.
  - e. Replace the word "Intelligence" with "Neural Networks" and display the new string.
29. a. Write a function `sum_natural(n)` that uses a for loop to compute the sum of all natural numbers from 1 to n. Explain each iteration. (6M)  
b. Take a string from the user and print the count of vowels in the string. (4M)