Q.P Code:D143774	Total Pages:2	Name 737247
		Register No.

FOURTH SEMESTER (CUFYUGP) DEGREE EXAMINATION, APRIL 2026

MATHEMATICS

MAT4CJ205
Fundamentals of Python and Sagemath

2024 Admission Onwards

Maximum Time :2 Hours	**Maximum Marks :70**

Section A

All Question can be answered. Each Question carries 3 marks (Ceiling: 24 Marks)

1	What is slicing in Python strings? Explain with an example
2	Explain the function `arange()` in NumPy.
3	What is the purpose of the `plot()` function?
4	Write a Python program to plot a simple line graph using Matplotlib.
5	What is the use of the `init_printing()` function in SymPy?
6	What is the purpose of the `read_csv()` function in Pandas?
7	What is SymPy?
8	How are exponents written in Sage?
9	Write a Sage command to find the sine of $\pi/3$.
10	Write the Sage command to compute the derivative of the function $$f(x) = x^4/3$$

Section B

All Question can be answered. Each Question carries 6 marks (Ceiling: 36 Marks)

11	Write Python code to print all perfect cubes upto 2000.
12	Explain different methods for creating NumPy arrays.
13	Write a Python program to plot Astroid
14	Explain the pyplot interface in Matplotlib. Give an example
15	Write a Python program using SymPy to define symbols x and y and print $\sqrt{x}$.
16	Write a Pandas program to create a Series with indices ['a','b','c','d'].
17	Explain how Sage can be used as a calculator. Write a Sage program to evaluate the expression $900(1 + 0.06(90/365))$.
18	Explain how square roots are computed in Sage. Write a Sage program to calculate $\sqrt{8}$ and its decimal approximation.

Section C

Answer any ONE. Each Question carries 10 marks (1x10=10 Marks)

19	1. Explain strings in Python and describe the different string operations 2. Create a program that will check a sentence to see if it is a palindrome
20	1. Explain the role of Figure and Axes objects in Matplotlib. 2. Using matplotlib 3D, write a Python program to plot $x^2 + y^2 + z^2 = 25$