RegisterNumber															

SRM Institute of Science and TechnologyCollegeofEngineeringandTechnology SchoolofComputing

Set-B

SRMNagar,Kattankulathur–603203,ChengalpattuDistrict,TamilNadu

AcademicYear:2024-25(Even)

Test: FT1 Date:25-02-2025

CourseCode&Title:21CSS303T-Data Science Duration:50 Minutes

Year& Sem: IIIYear /VISem Max.Marks:25

CourseArticulationMatrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	1	-	-	-	-	-	-	-
CO2	-	-	-	-	1	-	-	-	-	-	-	-

Note: CO1 - To understand the relationship between data
CO2 - Identify the different data structures to represent data

Part– A

(5x2= 10 Marks)

Answer ALL the questions

Q.No	Question	Marks	BL	CO	PO	PI.Code

1	Given the NumPy array arr = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]]), write the code to extract the second column as a 1D array.
	
	`import numpy as np`
	
	`arr = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])`
	
	`# Extract the second column (index 1) as a 1D array`
	`second_column = arr[:, 1]`
	
	`print(second_column)`
	
	`Output:`
	[2 5 8]
		2	3	2	5	5.4.2

2	How do you select a column from a Pandas DataFrame? Write the code.
	
	We can select a column from a Pandas DataFrame using its column name.
	`import pandas as pd`
	
	`# Create a DataFrame`
	`data = {'A': [1, 4, 7], 'B': [2, 5, 8], 'C': [3, 6, 9]}`
	`df = pd.DataFrame(data)`
		2	1	2	5	5.4.1

	`# Select column 'B' as a Series`
	`column_b = df['B']`
	
	`print(column_b)`
	Output
	`0 2`
	`1 5`
	`2 8`
	`Name: B, dtype: int64`					

3	Mention two sources from which data can be acquired for analysis. Two common sources from which data can be acquired for analysis are: 1. **Web APIs** o Many online services provide APIs to fetch structured data in formats like JSON or XML. o Example: Twitter API for social media analysis, OpenWeather API for weather data, and financial APIs for stock market data. 2. **Public Datasets and Open Data Portals** o Governments, research organizations, and companies provide free datasets for public use. o Example: Kaggle (https://www.kaggle.com/datasets), Google Dataset Search, and UCI Machine Learning Repository	2	1	1	5	5.5.1

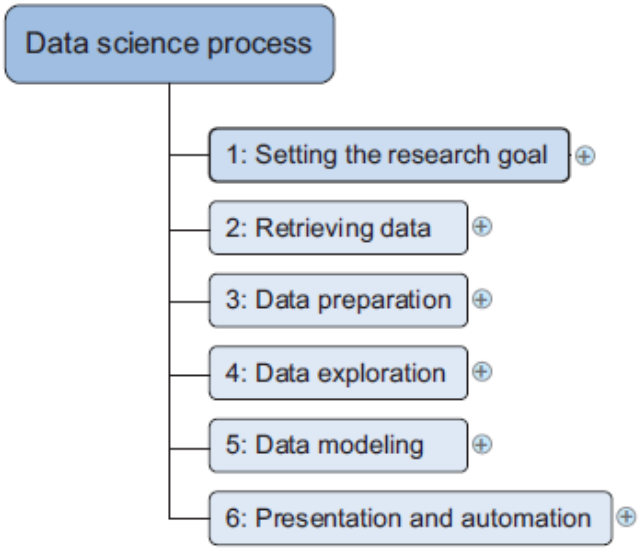
4	Write a Python program to add, subtract, multiply and divide two Pandas Series
	Sample Series: [2, 4, 6, 8, 10], [1, 3, 5, 7, 9]
	
	`import pandas as pd`
	
	`# Create two Pandas Series`
	`series1 = pd.Series([2, 4, 6, 8, 10])`
	`series2 = pd.Series([1, 3, 5, 7, 9])`
	
	`# Perform arithmetic operations`
	`addition = series1 + series2`
	`subtraction = series1 - series2`
	`multiplication = series1 * series2`
	`division = series1 / series2 # This will perform element-wise division`
	
	`# Display results`
	`print("Addition:\n", addition)`
	`print("\nSubtraction:\n", subtraction)`
	`print("\nMultiplication:\n", multiplication)`
	`print("\nDivision:\n", division)`
	
	Output
	`Addition:`
	`0 3`
	`1 7`
		2	2	1	5	5.4.2

	2 11 3 15 4 19 dtype: int64 Subtraction: 0 1 1 1 2 1 3 1 4 1 dtype: int64 Multiplication: 0 2 1 12 2 30 3 56 4 90 dtype: int64 Division: 0 2.000000 1 1.333333 2 1.200000 3 1.142857 4 1.111111 dtype: float64					
5	What are Web APIs and how are they used in Data Acquisition? **Web APIs** (Application Programming Interfaces) are a set of rules and protocols that allow different software applications to communicate with each other over the internet. They enable applications to request and exchange data, typically in a structured format like JSON or XML. In the context of **Data Acquisition**, Web APIs are used to retrieve or send data from one system to another, allowing for the automation of data collection from remote sources, such as databases, external systems, or online services	2	2	1	5	5.4.1

Part– B

(3x5= 15 Marks)

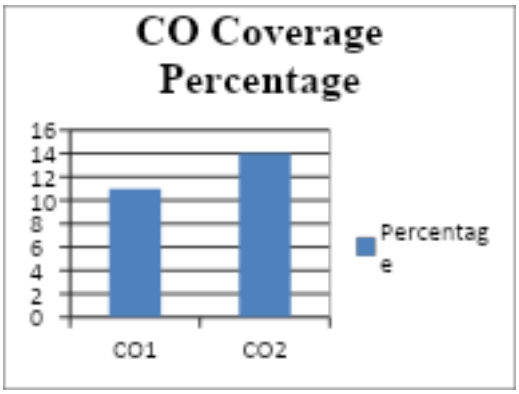
Q.No	Question	Marks	BL	CO	PO	PI.Code
1	Explain the complete Data Science Process in detail with suitable real-world examples.	5	2	1	5	5.4.1

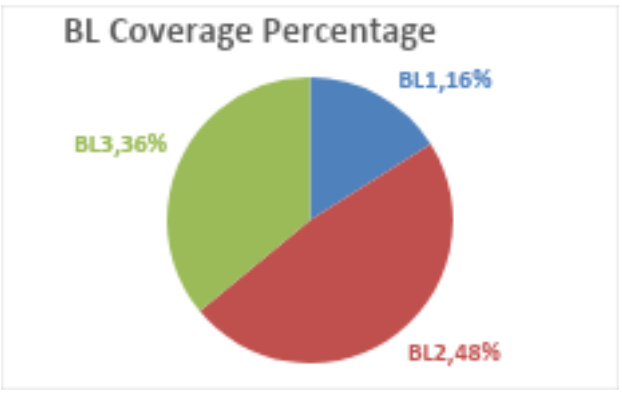
	 (Diagram - 1 mark) Explanation of each stage (4 marks)					

2	You're tasked with exploring a large dataset using Pandas. You suspect there might be a relationship between two columns: 'age' (numerical) and 'purchase_category' (categorical). Describe how you would use Pandas to investigate this potential relationship. Mention TWO specific Pandas functions you would use and explain their purpose in this context."
	
	To explore the relationship between **'age'** (numerical) and **'purchase_category'** (categorical), I would use the following two Pandas functions:
	1. groupby() (2.5 marks)
	• This function allows us to group data based on the categorical column ('purchase_category') and then compute summary statistics for the numerical column ('age').
	• **Purpose:** It helps in understanding the distribution of ages across different purchase categories.
	• **Example Usage:**
	import pandas as pd
	
	# Sample DataFrame
	data = {'age': [25, 34, 45, 23, 41, 36, 29, 50],
	'purchase_category': ['Electronics', 'Clothing', 'Electronics', 'Books', 'Books', 'Clothing', 'Electronics', 'Books']}
	
	df = pd.DataFrame(data)
	
	2. value_counts() (on grouped data) (2.5 marks)
	• Purpose: Helps count the occurrences of different purchase categories within specific age groups to identify buying patterns.
	• Example Usage:
	# Create age bins
	df['age_group'] = pd.cut(df['age'], bins=[20, 30, 40, 50, 60], labels=['20-30', '30-40', '40-50', '50-60'])
	
	# Count how many purchases are made in each category within age groups
	purchase_counts = df.groupby('age_group')['purchase_category'].value_counts()
	print(purchase_counts)
		5	2	2	5	5.5.1

3	You are developing a price comparison tool to track the price of a specific product (e.g., "iPhone 15" or "Samsung Galaxy S23") from multiple e-commerce websites such as Amazon, eBay, and Walmart. Explain the key steps involved in performing web scraping for this task, covering aspects such as identifying the target websites, extracting the relevant data, handling dynamic content, and storing the collected information for further analysis. Step 1: Identifying Target Websites (1 mark) ● Choose e-commerce platforms to track prices from, such as Amazon, eBay, Walmart, etc. ● Analyze the website structure by inspecting product pages to find relevant elements (e.g., price, product name, availability). ● Ensure that scraping these sites complies with their Terms of Service to avoid legal issues. Step 2: Extracting Relevant Data (1 mark) To extract product information, we need: ● Product name ● Price ● Availability ● Seller information ● Product URL Step 3: Handling Dynamic Content (JavaScript-Rendered Websites) (1 mark) ● Some websites dynamically load prices using JavaScript, making BeautifulSoup insufficient. ● Solution: Use Selenium or Scrapy to simulate user interaction and fetch content. Step 4: Storing Collected Data(1 mark) The extracted data should be stored for further analysis. Step 5: Automating Price Tracking (1 mark) ● Use scheduled tasks (cron jobs on Linux, Task Scheduler on Windows) to run the scraper at intervals (e.g., daily). ● Send email alerts when price drops below a threshold.	5	3	2	5	5.5.1

Course Outcome (CO)andBloom's level (BL)Coverage in Questions


CO Coverage Percentage
16
14
12
10
8
6
4
2
0
CO1
CO2
Percentage


BL Coverage Percentage
BL1,16%
BL3,36%
BL2,48%