Week1

MCQs (1 Mark each)

Q1. Who developed Python and in which year?
a) Dennis Ritchie, 1972
b) Guido van Rossum, 1980s
c) James Gosling, 1995
d) Rasmus Lerdorf, 1994

Answer: b) Guido van Rossum, 1980s

Q2. Which of the following is a valid variable name in Python?
a) 2value
b) value@123
c) my_value
d) value-1

Answer: c) my_value

Descriptive Questions (5–7 Marks each)

Q3. Explain the different types of operators in Python with suitable examples.

Answer:
Operators are special symbols used to perform computations.

- **Arithmetic Operators: +, -, *, /, %, ** (e.g., 10 + 5 = 15)**
- **Assignment Operators: =, +=, -=, *= (e.g., x += 2 means x = x+2)**
- **Relational Operators: <, >, ==, != (e.g., 5 > 3 → True)**
- **Logical Operators: and, or, not (e.g., (5 > 3) and (2 < 4) → True)**
- **Bitwise Operators: &, |, ~, ^ (operate on binary representation)**
- **Identity Operators: is, is not (check memory location)**
- **Membership Operators: in, not in (check presence in sequence, e.g., 4 in [1,2,3,4] → True)**

Q4. What are the basic data types in Python? Explain each with examples.

Answer:

Python supports the following basic data types:

1. **Boolean (bool): Represents logical values True or False.**
   Example: x = True
2. **Integer (int): Whole numbers (positive or negative).**
   Example: x = 10
3. **Float (float): Real numbers with decimal points.**
   Example: x = 3.14
4. **Complex (complex): Numbers with real and imaginary parts.**
   Example: x = 3 + 4j
5. **String (str): Sequence of characters enclosed in quotes.**
   Example: name = "Python"

These data types are the foundation of Python programming and are widely used in all applications.

Week2

MCQs (1 mark each)

Q1. Which of the following best describes sequence data?
a) Data collected in random order
b) Data where order does not matter
c) Data with inherent order and dependency across elements
d) Data that is always numerical

Answer: c) Data with inherent order and dependency across elements

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Q2. Which neural network model is most commonly used for handling sequential data?
a) Convolutional Neural Networks (CNNs)
b) Decision Trees
c) Recurrent Neural Networks (RNNs)
d) Support Vector Machines (SVMs)

Answer: c) Recurrent Neural Networks (RNNs)

Descriptive Questions (5–7 marks each)

Q3. Explain the difference between sequence data and non-sequence data with suitable examples.

Answer:

- **Sequence Data** has an inherent order where each element depends on previous elements. For example, **time series data** (stock prices, weather data) or **text data** (sentences, speech).
- **Non-sequence Data** has no natural ordering. For example, **tabular datasets** like student marks or patient records where the order of rows does not affect meaning.
- Key difference: **dependency & context matter in sequence data**, while they don't in non-sequence data.

Q4. Describe two methods for handling sequence data in machine learning and explain their applications.

Answer:

1. **Recurrent Neural Networks (RNNs):**
    - Designed to capture dependencies across time steps.
    - Applications: speech recognition, language translation, sentiment analysis.
2. **Long Short-Term Memory (LSTM):**
    - An improved RNN variant that solves the vanishing gradient problem.
    - Applications: text prediction, machine translation, financial forecasting.

Both methods preserve **contextual information** and are widely used in NLP, bioinformatics, and time-series prediction.