**Assignment**

**1.Define Artificial Intelligence (AI) and provide examples of its applications:**

AI refers to creating intelligent machines capable of tasks typically associated with human intelligence. It involves learning from data, adapting to new situations, and making decisions. **Applications:**

* **Healthcare**: AI assists in diagnostics, personalized treatment, and drug discovery.
* **Finance**: Fraud detection, algorithmic trading, and credit scoring.
* **Natural Language Processing (NLP)**: Chatbots, language translation, and sentiment analysis. o **Robotics**: Autonomous vehicles, drones, and industrial automation.
* **Recommendation Systems**: E-commerce, content recommendations, and personalized ads.
* **Education**: AI assists in personalized learning experiences,adaptive learning platforms,automated grading,and educational content generation.
* **Autonomous vehicles**: AI powers self-driving cars and drones,enabling them to perceive their environment,make decisions, and navigate safely.
* **Government**: AI is employed for various governmental functions, including traffic management,public safety, and administrative tasks like document processing.

**2.Differentiate between supervised and unsupervised learning techniques in ML:**

* **Supervised Learning**:
  + Uses labeled data (input-output pairs) for training.
  + Examples: Regression (predicting continuous values) and Classification (assigning data to predefined categories).
  + Training process: During training, the algorithm adjusts its parameters to minimize the discrepancy between its predictions and the actual labels in the training data.
  + Evaluation: The performance of a supervised learning model is typically evaluated using metrics such as accuracy, precision, recall, F1-score,or mean squared error, mean absolute error.

* **Unsupervised Learning**:
  + Uses unlabeled data to discover patterns and insights.
  + Examples: Clustering (grouping similar data) and Dimensionality Reduction (simplifying data representation).
  + Training process: Unsupervised learning algorithms typically do not have explicit targets during training. Instead, they iteratively find patterns in the data based on some predefined criteria.
  + Evaluation: Evaluating unsupervised learning algorithms is often more subjective and depends on the specific task.

**3.What is Python? Discuss its main features and advantages:**

* **Definition**: Python is a dynamic, high-level, free open-source, and interpreted programming language.
* **Features**:
  + **Easy to Learn**: Simple syntax and developer-friendly. o **Object-Oriented**: Supports classes, objects, and encapsulation.
  + **GUI Programming Support**: Modules like PyQt5 for graphical apps.
  + **Large Community Support**: Active StackOverflow community.
  + **Portable and Integrated**: Runs on various platforms and integrates with other languages.

**4.What are the advantages of using Python as a programming language for AI and ML?:**

* **Readability**: Clear syntax and indentation enhance code readability.
* **Rich Libraries**: Extensive libraries (e.g., NumPy, Pandas, TensorFlow) for AI/ML tasks.
* **Scalability**: Python scales well for large projects.
* **Community Support**: Active Python community and vast resources.
* **Integration**: Easily integrates with other languages.
* **Interpreted Language**: No need to manage memory or system architecture.

**5.Discuss the importance of indentation in Python code:**

* **Definition**: Python uses indentation to define code blocks.
* **Why?**: o Proper indentation ensures code readability. o Indentation errors lead to IndentationError.
  + It enforces a clean coding style and highlights code blocks.
* Example: **Python**

if site == 'gfg':

print('Logging on to geeksforgeeks...') else: print('retype the URL.')

print('All set!')

**6.Define a variable in Python. Provide examples of valid variable names:**

* A variable stores data. Example: age = 25.
* Explain the difference between a keyword and an identifier in Python:
* **Keyword**: Reserved words (e.g., if, else, while) with predefined meanings.
* **Identifier**: User-defined names (e.g., variable names) following rules (start with a letter/underscore, no spaces).
* List the basic data types available in Python:
* **Integers**: Whole numbers (e.g., 42).
* **Floats**: Decimal numbers (e.g., 3.14).
* **Strings**: Text (e.g., "Hello, World!").
* **Booleans**: True or False.
* Describe the syntax for an if statement in Python:
* Syntax: **Python**

if condition:

# Code block executed if condition is True

**7.Explain the purpose of the elif statement in Python:**

* Used for multiple conditional checks after an initial if.
* Executes a different block of code if the first condition is False.
* Example: **Python** if x > 0:

print('Positive') elif x < 0: print('Negative') else:

print('Zero')

**8.List the basic data types available in Python:**

* + **Integers**: Whole numbers (e.g., 42). o **Floats**: Decimal numbers (e.g., 3.14). o **Strings**: Text (e.g., "Hello, World!").
  + **Booleans**: True or False.

**9.Describe the syntax for an if statement in Python:**

* + Syntax: **Python**

if condition:

* + # Code block executed if condition is True

**10.Explain the purpose of the elif statement in Python:** o Used for multiple conditional checks after an initial if. o Executes a different block of code if the first condition is False.

* + Example: **Python**

if x > 0:

* + print('Positive') o elif x < 0: o print('Negative') o else: o print('Zero')