Assignment 1

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

Artificial intelligence refers to computer systems that are capable of performing tasks traditionally associated with human intelligence such as making predictions, identifying objects, interpreting speech and generating natural language. AI systems learn how to do so by processing massive amounts of data and looking for patterns to model in their own decision-making. In many cases, humans will supervise an AI's learning process, reinforcing good decisions and discouraging bad ones, but some AI systems are designed to learn without supervision.

Over time, AI systems improve on their performance of specific tasks, allowing them to adapt to new inputs and make decisions without being explicitly programmed to do so. In essence, artificial intelligence is about teaching machines to think and learn like humans, with the goal of automating work and solving problems more efficiently.

Uses of Artificial intelligence:
Healthcare: AI is used for medical diagnosis, drug discovery, and predictive analysis of diseases.
Retail: AI is used for product recommendations, price optimization, and supply chain management.
Finance: AI helps in credit scoring, fraud detection, and financial forecasting.
Manufacturing: AI helps in quality control, predictive maintenance, and production optimization.
Transportation: AI is used for autonomous vehicles, traffic prediction, and route optimization.
Customer service: AI-powered chatbots are used for customer support, answering frequently asked questions, and handling simple requests.
Security: AI is used for facial recognition, intrusion detection, and cybersecurity threat analysis.
Marketing: AI is used for targeted advertising, customer segmentation, and sentiment analysis.
Education: AI is used for personalized learning, adaptive testing, and intelligent tutoring systems.

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

Supervised learning
When an algorithm is trained on a labelled dataset—that is, when the input data used for training is paired with corresponding output labels is referred to as supervised learning. Supervised learning aims to find a mapping or relationship between the input variables and the desired output, which enables the algorithm to produce precise predictions or classifications when faced with fresh, unobserved data.

An input-output pair training set is given to the algorithm during a supervised learning process. For every example in the training set, the algorithm iteratively modifies its

parameters to minimize the discrepancy between its predicted output and the actual output (the ground truth). This procedure keeps going until the algorithm performs at an acceptable level.
Supervised learning can be divided into two main types:
1 .Reggression: In regression problems, the goal is to predict a continuous output or value. For example, predicting the price of a house based on its features, such as the number of bedrooms, square footage, and location.
2. Classification: In classification problems, the goal is to assign input data to one of several predefined categories or classes. Examples include spam email detection, image classification (e.g., identifying whether an image contains a cat or a dog), and sentiment analysis.
Unsupervised Learning
Unsupervised learning is a type of machine learning where the algorithm is given input data without explicit instructions on what to do with it. In unsupervised learning, the algorithm tries to find patterns, structures, or relationships in the data without the guidance of labelled output.
The main goal of unsupervised learning is often to explore the inherent structure within a set of data points. This can involve identifying clusters of similar data points, detecting outliers, reducing the dimensionality of the data, or discovering patterns and associations.
There are several common types of unsupervised learning techniques:
1.Clustering: Clustering algorithms aim to group similar data points into clusters based on some similarity metric. K-means clustering and hierarchical clustering are examples of unsupervised clustering techniques.
2.Dimensionality reduction: These techniques aim to reduce the number of features (or dimensions) in the data while preserving its essential information. Principal Component Analysis (PCA) and t-distributed Stochastic Neighbor Embedding (t-SNE) are examples of dimensionality reduction methods.

3.Association: Association rule learning is used to discover interesting relationships or associations between variables in large datasets. The Apriori algorithm is a well-known example used for association rule learning.

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

Python: Python is a set of instructions that we give in the form of a Programme to our computer to perform any specific task. It is a Programming language having properties like it is interpreted, object-oriented and it is high-level too. Due to its beginner-friendly syntax, it became a clear choice for beginners to start their programming journey. The major focus behind creating it is making it easier for developers to read and understand,also reducing the lines of code.
Python Syntax
Syntax in a programming language is a standard way of expressing values or statements which every programming language follows.
To print a statement- *print("Hello World")*
Output: Hello World
Features of Python:
Python has plenty of features that make it the most demanding and popular. Let's read about a few of the best features that Python has:
Easy to read and understand
Interpreted language

Object-oriented programming language
Free and open-source
Versatile and Extensible
Multi-platform
Hundreds of libraries and frameworks
Flexible, supports GUI
Dynamically typed
Huge and active community

Advantages of Python:

Easy to learn, read, and understand
Versatile and open-source
Improves productivity
Supports libraries
Huge library
Strong community
Interpreted language

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

The advantages of using python as a programming language for AI and ML.

1. A great library ecosystem

2. A low entry barrier

3. Flexibility

4. Platform independence

5. Readability

6. Good visualization options

7. Community support

8. Growing popularity

5.Discuss the importance of indentation in Python code.

The primary purpose of indentation in Python is to define the scope of statements, such as those within loops, conditionals, functions, and classes. Consistent and proper indentation is crucial for the interpreter to understand the logical structure of the code. Indentation is not just a matter of style or convention in Python.

Rules of Indentation in Python

Here are the rules of indentation in python:

1.Python's default indentation spaces are four spaces. The number of spaces, however, is entirely up to the user. However, a minimum of one space is required to indent a statement.

2.Indentation is not permitted on the first line of Python code.

3.Python requires indentation to define statement blocks.

4.A block of code must have a consistent number of spaces.

5.To indent in Python, whitespaces are preferred over tabs. Also, use either whitespace or tabs to indent; mixing tabs and whitespaces in indentation can result in incorrect indentation errors.

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

Python Variable is containers that store values. Python is not “statically typed”. We do not need to declare variables before using them or declare their type. A variable is created the moment we first assign a value to it. A Python variable is a name given to a memory location. It is the basic unit of storage in a program. In this article, we will see how to define a variable in python.

Example of Variable in Python

An Example of a Variable in Python is a representational name that serves as a pointer to an object. Once an object is assigned to a variable, it can be referred to by that name. In layman’s terms, we can say that Variable in Python is containers that store values.

Here we have stored “**Geeksforgeeks**” in a variable **var**, and when we call its name the stored information will get printed.

```
Var = "HELLO INDIA"

print(Var)
```

Output:

```
HELLO INDIA
```

7.Explain the difference between a keyword and an identifier in Python.

S.No	**Keyword**	**identifier**
1	A keyword refers to a predefined word that python reserves for working programs that have a specific meaning, You can’t use a keyword anywhere else.	Python Identifiers are the different values that a programmer can use to define various variables, integers, functions, and classes.
2	A keyword can specify the type of entity.	An identifier can identify a single entity (a variable, a class, or a

		function).
3	All the keywords except ‘True’, ‘False’, and ‘None’ start in lowercase letters.	The first character can be a lowercase letter or an uppercase letter. However, an identifier can’t start with a digit.
4	Keywords are generally in lower case.	A variable can be in uppercase or lowercase letters.
5	Python Keywords comprise alphabetical characters.	An identifier can comprise alphabets, numbers, and underscore.
6	There is no use of special characters.	No special character is used except underscore (‘_’).
7	A few examples of Python keywords are: True, False, else, import, finally, is, and global	A few examples of identifiers are testing, sq4 sides, area_square, etc.

8.List the basic data types available in Python.

Python Data types are the classification or categorization of data items. It represents the kind of value that tells what operations can be performed on a particular data. Since everything is an object in Python programming, Python data types are classes and variables are instances (objects) of these classes. The following are the standard or built-in data types in Python:

=>Numeric

=>Sequence Type

=>Boolean

=>Set

=>Dictionary

=>Binary Types(memoryview, bytearray, bytes)

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

Python If Statement:

The if statement is the most simple decision-making statement. It is used to decide whether a certain statement or block of statements will be executed or not.
Syntax of If Statement in Python

Here, the condition after evaluation will be either true or false. if the statement accepts boolean values – if the value is true then it will execute the block of statements below it otherwise not.

```
#if syntax Python
if condition:
  # Statements to execute if
  # condition is true
```

As we know, python uses indentation to identify a block. So the block under the Python if statements will be identified as shown in the below example:

```
if condition:
statement1
statement2
# Here if the condition is true, if block
# will consider only statement1 to be inside
# its block.
```

10. Explain the purpose of the elif statement in Python.

The “elif” keyword in Python, stands for “else if”. It can be used in conditional statements to check for multiple conditions. For example, if the first condition is false, it moves on to the next “elif” statement to check if that condition is true. If none of the conditions are true, the code will execute the else statement.

Examples of using “elif” in Python

Elif Syntax

“Elif” stands for “else if” in Python. Here’s a very simple example of where is can be used to check multiple conditions and execute a block of code if the conditions are true. The syntax is as follows:

```
If condition1:
    # execute code if condition1 is true
elif condition2:
    # execute code if condition2 is true
else:
```

```
    # execute code if all conditions are false
```

Here’s another simple example where “elif” is used in Python.

```
x = 10


if x > 10:
    print("x is greater than 10")
elif x < 10:
    print("x is less than 10")
else:
    print("x is equal to 10")
```

In the example above, Python checks the value of the variable x against multiple conditions. If x is greater than 10, it prints “x is greater than 10”. If x is less than 10, it prints “x is less than 10”. Otherwise, if neither of the previous conditions is met, it prints “x is equal to 10”.