**6. Dictionaries**

1. **Introduction to dictionaries: key-value pairs.**

What is a dictionary?

A dictionary (*dict*) is a **mutable**, **ordered** (since Python 3.7), and **indexed** collection that maps **unique, immutable keys** to **values of any data type**

* **Keys** must be immutable (e.g., strings, numbers, tuples) and **unique**—duplicates overwrite existing entries .
* **Values** can be any type—even other dicts or lists—and need not be unique.

Example :

d = {“name”:”ajay”}

for k, v in d.items():

print(f"{k}: {v}")

**Iterating through dictionaries**

Loop through:

* **Keys**: for k in d:
* **Values**: for v in d.values():
* **Pairs**: for k, v in d.items():

1. **Accessing, adding, updating, and deleting dictionary elements**

1. Accessing Elements :

* Bracket notation: value = d[key]
  + Direct lookup; fast (O(1)) due to hashing
  + Raises KeyError if the key doesn't exist
* get() method: value = d.get(key, default)
  + Returns default (or None) if the key is absent—safer access

2. Adding & Updating Elements

* Direct assignment: d[key] = value
  + Creates a new entry or updates an existing key; average-case O(1)
* update() method: d.update(other\_dict) or d.update(k=3, v=4)
  + Merges key-value pairs from another dict or via keyword args
* Merge operators (Python 3.9+):

3. Deleting Elements

* del d[key]
  + Removes the key; raises KeyError if key not present
* d.pop(key[, default])
  + Removes and returns the value; returns default if key absent (optional)
* d.popitem()
  + Removes and returns the *last-inserted* key-value pair ((key, value)) in Python 3.7+
* d.clear()
  + - Empties the entire dictionary

1. **Dictionary methods like keys(), values(), and items().**
2. dict.keys()

* Returns a dict\_keys view of all keys.
* Supports iteration and in checks.
* Converts to a list for snapshot or indexing.

1. dict.values()

* Returns a dict\_values view of all values.
* Useful for iteration and summarizing values.
* Also dynamic; converts to list when needed.

1. dict.items()

* Returns a dict\_items view of (key, value) tuples.
* Great for tuple unpacking in loops.
* Updates with dictionary; can be converted to list.