**Assignment 9: Implementing a Simple Chatbot**

**Problem Statement**

The goal of this assignment is to design and implement a **rule-based Chatbot** that can interact with users using predefined responses. The chatbot should process user input, match it against rules or patterns, and return appropriate responses.

**Objectives**

* Learn the basics of chatbot design and implementation.
* Understand natural language input and response generation.
* Implement rule-based conversation handling using programming constructs.

**Theory**

**What is Chatbot?**

A **Chatbot** is a computer program designed to simulate conversation with human users. It can be:

* **Rule-based**: Uses predefined rules and patterns to generate responses.
* **AI-based**: Uses NLP and machine learning for more intelligent interactions.

**Methodology**

1. **Define Knowledge Base / Rules**
   1. Create a set of patterns or keywords (e.g., greetings, farewells, common queries).
   2. Map each pattern to a response.
2. **User Input Processing**
   1. Accept text input from the user.
   2. Normalize the text (remove extra spaces, lowercase conversion).
3. **Response Generation**
   1. Match the input with predefined rules.
   2. Return the corresponding response.
   3. If no match is found, return a default response (e.g., “I didn’t understand that”).
4. **Conversation Loop**
   1. Keep interacting with the user until they type an exit command (e.g., "bye").

**Working Principle / Algorithm**

1. Start chatbot.
2. Wait for user input.
3. If input matches a known pattern:
   1. Return corresponding response.
4. Else:
   1. Return default “I don’t understand” response.
5. Repeat until user exits.

**Advantages**

* Easy to implement with simple rules.
* Fast and predictable responses.
* Good for FAQs or limited domains.

**Disadvantages / Limitations**

* Cannot handle complex or unexpected inputs.
* No real understanding of natural language.
* Lacks personalization and learning ability.

**Diagram**

User Input

Pattern Matching

Response Generator

Chat Output

**Conclusion**

A **rule-based Chatbot** demonstrates the fundamentals of conversational systems. It shows how **pattern matching** and **response mapping** can simulate simple dialogue. Although limited, this forms the foundation for more advanced **AI-based chatbots** that use **NLP and machine learning**.