



NARSIMHA REDDY ENGINEERING COLLEGE

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FORMAL LANGUAGES AND AUTOMATA THEORY (23CY503)

UNIT I – Introduction to Finite Automata

Part-A: Short Answer Questions

1. Define Alphabet in Automata Theory.
2. What is a String?
3. Define Language.
4. What is a Finite Automaton?
5. Define Deterministic Finite Automaton (DFA).
6. Define Nondeterministic Finite Automaton (NFA).
7. What is an ϵ -transition?
8. Differentiate between DFA and NFA.
9. What is the language accepted by an automaton?
10. Define Transition Function.

Part-B: Descriptive Questions

1. Explain the central concepts of Automata Theory with examples.
2. Discuss structural representations of finite automata.
3. Explain the formal definition of NFA with suitable examples.
4. Describe ϵ -NFA and its applications.
5. Explain the working of DFA with state transition diagrams.
6. Convert an ϵ -NFA into an NFA without ϵ -transitions.

Tutorial Assignment:

Design DFA and NFA for strings ending with “01” over $\Sigma=\{0,1\}$.

Part-C: MCQs

1. DFA stands for
 - A) Deterministic Finite Automata
 - B) Dynamic Finite Automata
 - C) Defined Finite Automata
 - D) Direct Finite Automata
2. NFA stands for
 - A) Non-deterministic Finite Automata
 - B) New Finite Automata
 - C) Nested Finite Automata
 - D) None
3. DFA has
 - A) Exactly one transition per symbol
 - B) Multiple transitions
 - C) No transitions
 - D) Infinite states
4. NFA may have

- A) Multiple transitions for same input ✓
 - B) One transition only
 - C) No states
 - D) Infinite tape
5. ϵ -transition consumes
- A) No input symbol ✓
 - B) One symbol
 - C) Two symbols
 - D) Infinite symbols
6. Finite automata are used in
- A) Lexical analysis ✓
 - B) Database design
 - C) Networking only
 - D) None
7. A DFA consists of
- A) 5-tuple ✓
 - B) 3-tuple
 - C) 2-tuple
 - D) 6-tuple
8. The start state is
- A) Initial state ✓
 - B) Final state
 - C) Dead state
 - D) Trap state
9. Final states are also called
- A) Accepting states ✓
 - B) Rejecting states
 - C) Intermediate states
 - D) Error states
10. NFA and DFA recognize
- A) Regular languages ✓
 - B) CFL
 - C) CSL
 - D) Recursive languages

Part D: Fill in the Blanks:

1. DFA stands for **Deterministic Finite Automata**.
2. NFA stands for **Non-deterministic Finite Automata**.
3. A finite automaton consists of a finite set of **states**.
4. The set of input symbols is called an **alphabet**.
5. A sequence of symbols is called a **string**.
6. The start state is also known as the **initial** state.
7. Accepting states are called **final** states.
8. ϵ -transition consumes **no** input symbol.
9. DFA recognizes **regular** languages.
10. NFA recognizes **regular** languages.
11. Transition function in DFA is denoted by δ .
12. Finite automata are used in **lexical analysis**.
13. The collection of strings is called a **language**.

14. A state diagram is a graphical representation of an **automaton**.
15. NFA can have **multiple** transitions for a symbol.
16. DFA has **exactly one** transition for each symbol.
17. Strings are formed using symbols from an **alphabet**.
18. The language accepted by an automaton is a set of **strings**.
19. ϵ represents the **empty string**.
20. Automata theory is a branch of **theoretical computer science**.