B5.2-R4: AUTOMATA THEORY AND COMPILER DESIGN

NOTE:

> 1. **Answer question 1 and any FOUR from questions 2 to 7.**
> 2. **Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours   **Total Marks: 100**

1.
a)   Explain the role of Mathematical Induction in Compiler design.
b)   Differentiate among Grammar 0, 1, 2, 3, 4.
c)   Discuss the advantage and disadvantage of Mealy and Moore machine.
d)   Explain l-value and r-value and its use in compiler design.
e)   Differentiate between PDA and Turing machine. Provide an example of both machines.
f)   List and explain four compiler construction tools.
g)   What are the roles of DAG in compiler design? Provide an example to validate your answer.

                                                                                                         (7x4)

2.
a)   Construct a DFA machine that accepts all palindrome string.
b)   Discuss the steps to convert NFA to DFA. Provide an example to demonstrate the steps.

                                                                                                         (9+9)

3.
a)   Discuss and explain Bacus Normal Form and CNF using an example.
b)   Define pumping lemma and prove that $\{a^n c^n \mid n>=1\}$ is not a regular language.

                                                                                                         (9+9)

4.
a)   Construct a grammar generating the expression $\{a^n b^{2n} c^n | n>=1\}$.
b)   Differentiate between Non-Deterministic Turing Machine and Deterministic Turing Machine.

                                                                                                         (9+9)

5.
a)   Explain various types of Compilers. Explain the mechanism and usage of cross compiler.
b)   Define the following terms used in compiler construction.
    i)   Lexical Analyzer
    ii)   Token Recognizer

                                                                                                         (9+9)

6.
a)   Explain top-down parsing and Bottom- up parsing. Discuss their role in Compiler design. Also discuss their advantages and disadvantages.
b)   Discuss operator precedence parsing technique with its merits and demerits. Provide an example to understand the execution steps of Operator precedence parsing.

                                                                                                         (9+9)

7.   Write short notes on **any three** of the following:
a)   Data Flow Analysis
b)   Dynamic memory allocation
c)   Syntax directed translation
d)   Phase and their grouping in compiler

                                                                                                         (3x6)