Sl. No.

B5.2-R4 : AUTOMATA THEORY AND COMPILER DESIGN

NOTE :
1. **Answer question 1 and any FOUR questions from 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 Arden's Theorem for regular expression.
   (b) Describe the rules to resolve the ambiguity for grammar.
   (c) What is a Symbol table ? Explain.
   (d) What is the difference between interpreter, assembler and linker ?
   (e) Describe the architecture of Compiler Design.
   (f) Show that the given grammar is ambiguous.
   E->E+E/E*E/(E)/a/b
   (g) What is Syntax Analysis ?   **(7x4)**

2. (a) What are the specifications of Tokens in Compiler Design ?
   (b) Explain the process for CFG simplification.
   (c) Remove the unit production from the following.
   $S \rightarrow XY, X \rightarrow a, Y \rightarrow Z \mid b, Z \rightarrow M, M \rightarrow N, N \rightarrow a$
   (d) Explain lexical analysis of Compiler Design.   **(5+5+4+4)**

3. (a) Differentiate between Deterministic and Non-deterministic finite automata.
   (b) What is a derivation in Compiler Design ? Explain left most and right most derivation.
   (c) Explain Greibach Normal form. Also describe converting CFG to GNF.
   (d) Describe the algorithm to calculate first and follow sets.   **(4+5+4+5)**

4. (a) Explain the principle of Linear Bounded Automata.
   (b) Design a TM to recognize all strings which includes an odd number of α's.
   (c) Convert the following NFA to DFA.
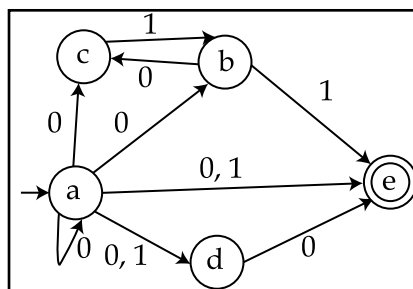
   (d) Construct a PDA from the following CFG. Also show the steps of conversion.
   $G = (\{S, X\}, \{a, b\}, P, S)$
   Where the productions are ?
   $S \rightarrow XS \mid \varepsilon , A \rightarrow aXb \mid Ab \mid ab$ **(4+4+4+6)**

---

5. (a) What are the kinds of errors in Compiler Design ? Give various error recovery strategies.

(b) Explain the basic structure of Push down Automata.

(c) Explain how the intermediate code is transformed into target object code or assembles code. **(6+6+6)**

6. (a) What are the different types of parsing in Compiler Design ?

(b) Explain Pumping Lemma and its application with example.

(c) Explain the working of Top down parser. **(6+6+6)**

7. (a) What are the different Phases of a Compiler ?

(b) Explain the process of conversion to CNF. Also convert the following CFG into CNF :

S → ASA | aB, A → B | S, B → b | ε **(9+9)**

- o O o -