

## B52-R4 : AUTOMATA THEORY AND COMPILER DESIGN

**NOTE :**

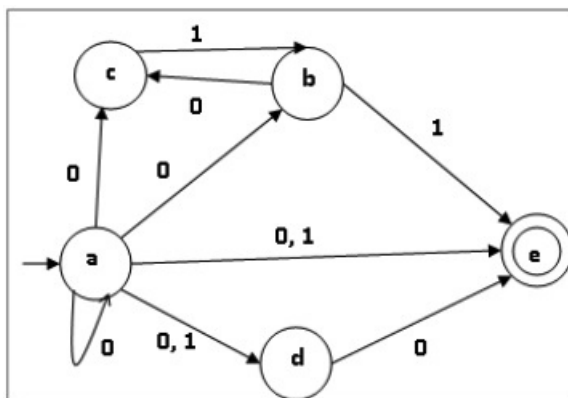
1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Total Time : 3 Hours

Total Marks : 100

1. (a) Explain sets and functions with example.  
 (b) What is language in theory of automata? What are its types ? Give example.  
 (c) Define Context-Free Grammar. Construct a CFG for the regular expression  $(0 + a)^*$   
 (d) Design a FA (Finite Automata) with  $\Sigma = \{0, 1\}$  that accepts those string which starts with 1 and ends with 0.  
 (e) Write four differences between Compiler and Interpreter.  
 (f) Explain S-attributed SDT and L-attributed SDT.  
 (g) Write a short note on Dynamic Memory Allocation. (7x4)

2. (a) Convert following NFA to its equivalent DFA.



- (b) What does mean by Minimization of DFA ? Write an algorithm to minimize DFA.
  - (c) What is regular expression? Which operations can be performed on regular expression ? (6+6+6)
3. (a) What is Finite Automata ? Give formal definition of Finite Automata. Which are the types of Finite Automata ? Explain in detail.  
 (b) What does Chomsky Hierarchy represents ? Explain category of language in Chomsky's Hierarchy in brief. (9+9)

4. (a) Define Unambiguous Grammar. Show that the given grammar is ambiguous. Also, find an equivalent unambiguous grammar.
- $E \rightarrow E + E$   
 $E \rightarrow E * E$   
 $E \rightarrow id$
- (b) What is a pushdown automaton (PDA) ? What are the components of PDA ? How it is formally defined ?
- (c) Write short note on Turing Machine. (6+6+6)
5. (a) Find whether the following grammar is LL(1) or not, and construct a predictive parsing table for the following grammar.
- $S \rightarrow iEtSS' \mid a$   
 $S' \rightarrow eS \mid \epsilon$   
 $E \rightarrow b$
- (b) How storage organization works by compiler for executable program ? Explain in detail. (9+9)
6. (a) What is the role of parsing ? Explain different types of parsing in compiler design.
- (b) Which are the types of data flow analysis performed by compilers ? Describe in brief.
- (c) Write a three address code of following program :
- ```
fact(x)
{
    int f=1;
    for (i=2; i <= x; i++)
        f=f*i;
    return f;
}
```
- (6+6+6)
7. (a) What is compiler ? Explain the different phases of a compiler.
- (b) What are the issues in the design of a code generator ? Explain in detail. (9+9)

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