

B.Tech. 5th Semester (CSE) F-Scheme Examination,
December-2017

THEORY OF AUTOMATA COMPUTATION

Paper-CSE-305-F

Time allowed : 3 hours]

[Maximum marks : 100

*Note : Question No. 1 is compulsory. Attempt five questions
in total selecting one question from each section.*

1. Explain the following questions : 10×2
- (a) Any two differences between DFA and NFA.
 - (b) Define finite automata with output briefly.
 - (c) What do you understand by epsilon-closure of a state in finite automata ?
 - (d) Explain closure properties of regular languages.
 - (e) What is context sensitive languages ?
 - (f) Give formal definition of a PDA.
 - (g) When do you say that turing machine accept a string ?
 - (h) Give an example of an undecidable problem.
 - (i) Differentiate L^+ and L^* .
 - (j) State Halting problem of Turing machine.

Section-A

2. (a) Design a DFA which accepts even number of a's over the alphabet {a,b}. 10
- (b) Explain the Limitations of Finite Automata. 5
- (c) State and prove Arden's method. 5

3. (a) Construct a Finite Automata equivalent to the regular expressions : 10
 $ba + (a + bb)a^*b$
- (b) Construct a DFA accepting all strings over $\{a,b\}$ ending in ab . 10

Section-B

4. (a) Prove that a language is regular if and only if it is accepted by finite automata. 10
- (b) What is meant by ambiguity ? How we can test the ambiguity of a grammar ? 5
- (c) Define leftmost and rightmost derivations. Give examples. 5
5. (a) Define Chomsky normal form. Simplify the following CFG and convert it into CNF: 10

$$S \rightarrow ASB | \epsilon$$

$$A \rightarrow aAS | a$$

$$B \rightarrow SbS | A | bb$$

- (b) State and prove pumping lemma for regular languages. Show that the language. 10

$$L = \{ WW^R | W \in \Sigma(a,b)^* \}$$
 is not regular.

Section-C

6. (a) Explain the programming techniques involved in Turing machine. 10
- (b) Construct PDA M to accept the language having equal number of 0's and 1's. 10

7. (a) Define Turing machine. Design a Turing machine that computes the integer function f defined as follows: 10
 $f(n) = 3^n$ where n is integer and $n \geq 0$
- (b) Differentiate between PDA and NPDA with the help of example. 10

Section-D

8. Explain the following with example: 10x2
- (a) Partial recursive functions
- (b) Primitive recursive functions
9. What do you mean by computability ? Explain in detail. 20