24266

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

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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. http://haryanapapers.com 5

5. (a) Define Chomsky normal form. Simplify the following CFG and convert it into CNF : 10

$S \rightarrow ASB \mid \varepsilon$

$A \rightarrow aAS \mid a$

$B \rightarrow SbS \mid A \mid bb$

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

$L = \{WW^R \mid W \Sigma(a,b)^*\}$ 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 : 10×2

(a) Partial recursive functions

(b) Primitive recursive functions

9. What do you mean by computability ? Explain in detail. 20