Roll No. | | | | | | | | | | |

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech.(CSE) (2011 Onwards) (Sem.–7,8)

THEORY OF COMPUTATION

Subject Code : BTCS-702

Paper ID : [A2986]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a. Define Transition system.

   b. Construct a Grammar which generates all even integer's upto 998.

   c. If each of the production in a grammar has some variable on its RHS, what can you say about L(G)?

   d. Describe the following set by Regular Expression {01,10}

   e. Define a Derivation Tree.

   f. Compare the computational powers of Pushdown Automata and Finite Automata.

   g. Define LR(k) grammars.

   h. Define Pumping Lemma.

   i. Give two properties of Regular Languages.

   j. Give the representation of Turing machine by Instantaneous Descriptor.

SECTION-B

2. Construct a nondeterministic finite automata accepting {ab, ba}, and use it to find a deterministic automaton accepting the same set.

3. Reduce the following grammar to Greibach normal form :

   $S \rightarrow AB$, $A \rightarrow BSB$, $A \rightarrow BB$, $B \rightarrow aAb$, $B \rightarrow a$, $A \rightarrow b$

4. Prove that the following grammar is ambiguous :

   $S \rightarrow a/abSb/aAb$

   $A \rightarrow bS/aAAb$

5. Design a PDA to accept the language of nested balanced parentheses where number of opening parenthesis and closing parenthesis is greater than zero.

6. Discuss the Chomsky Hierarchy of Languages by taking suitable example for each classification.

SECTION-C

7. Discuss the various variants of Turing Machines by taking suitable examples.

8. For the PDA M design the corresponding CFG G

   $M = (\{q_0\ q_1\}, \{0,1\}, \{Z_0, K\}, \delta, q_0, Z_0, \Phi)$ with the transition function defined as follows :

   a. $\delta (q_0,1, Z_0) \text{ |--(} q_0,KK\ Z_0)$

   b. $\delta (q_0,0, K) \text{ |--(} q_1, K)$

   c. $\delta (q_0, \wedge, Z_0) \text{ |--(} q_0, \wedge)$

   d. $\delta (q_1, 0, K) \text{ |--(} q_1, \wedge)$

   e. $\delta (q_0, 1, K) \text{ |--(} q_0, KK)$

   f. $\delta (q_1, 0, Z_0) \text{ |--(} q_0, Z_0)$

9. Write short notes on following :

   a. Recursively Enumerable Languages

   b. Halting Problem