Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40911

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fifth/Eighth Semester

Computer Science and Engineering

CS 6503 – THEORY OF COMPUTATION

(Common to Information Technology)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. Define Non-deterministic Automata (NFA).
2. Write the regular expression for the set of all strings of 0's and 1's not containing 101 as substring.
3. Define Ambiguity.
4. State Chomsky normal form theorem.
5. When is PDA said to be deterministic ?
6. What are the ways of language acceptance in PDA ?
7. Define Turing Machine.
8. Define Chomsky hierarchy of language.
9. What do you mean by Universal Turing machine ?
10. When is a language said to be recursively enumerable ?

PART – B (5×13=65 Marks)

11. a) Describe the closure properties of regular languages. (13)

(OR)

b) Determine DFA from a given NFA : (13)

$M = (\{q_0, q_1\}, \{0, 1\}, \delta, q_0, \{q_1\})$ where δ is given by

$\delta(q_0, 0) = \{q_0, q_1\}$, $\delta(q_0, 1) = \{q_1\}$, $\delta(q_1, 0) = \varphi$, $\delta(q_1, 1) = \{q_0, q_1\}$

12. a) With an example convert CFG to Greiback Normal form. (13)

(OR)

b) Explain simplification of CFG with examples. (13)

13. a) i) Construct PDA for the language $\{WCW^R/W \in \{0,1\}\}$. (8)

ii) Construct CFG for the constructed PDA. (5)

(OR)

b) i) Explain pumping lemma for Context Free Languages with example. (7)

ii) Show that Deterministic PDA is less powerful than nondeterministic PDA. (6)

14. a) Construct a Turing machine that perform unary multiplication (Say 111 × 11 = 111111). (13)

(OR)

b) i) Elaborate on programming techniques for Turing machine construction. (5)

ii) Construct turing machine for the language $\{WW/W \in \{a,b\}\}$. (8)

15. a) i) Prove that the diagonalization language (L_d) is not a recursively enumerable. (7)

ii) Write note on primitive recursive functions. (6)

(OR)

b) Write note on NP complete problems and Polynomial time reduction. (13)

PART – C (1×15=15 Marks)

16. a) Analyze the limitation of automata for Type 3, Type 2, Type 0 languages. (15)

(OR)

b) i) Show that Halting problem is undecidable. (10)

ii) Compare Tactable and untactable problems. (5)