

17P165

(Pages:2)

Name:

Reg. No.

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2017

(CUCSS-PG)

CC17P CSS1 C03 – THEORY OF COMPUTATION

(Computer Science)

(Regular - 2017 Admissions)

Time: Three Hours

Maximum: 36 Weightage

PART A

(Short Questions)

Answer *all* questions. Each question carries 1 weightage.

1. What is PCP Problem?
2. Define Homomorphism.
3. Construct an npda for the language $L = \{a^n b^{2n} : n \geq 0\}$
4. Define Grammar.
5. Differentiate between context free grammar and context sensitive grammar.
6. What is the principle of mathematical induction?
7. What do you mean by Linear Bounded Automata?
8. For $\Sigma = \{a, b\}$ Prove that the language $L = \{ww^R : w \in \Sigma^*\}$ is not regular.
9. Define regular expression with example.
10. For $\Sigma = \{a, b\}$, Construct a DFA that accept the set consisting of all strings with exactly one a.
11. What is the difference between sentence and sentential form?
12. Describe Universal Turing machine.

(12 x 1 = 12 Weightage)

PART B

(Short Answer Questions)

Answer any *six* questions. Each question carries 2 weightage.

13. Explain the equivalence of type 0 grammars with Turing machines.
14. State and prove pumping lemma for context free languages with example.
15. Explain DFA state minimization.
16. Write a note on Chomsky hierarchy.
17. Explain the closure properties of recursively enumerable languages.
18. Explain Halting problem.
19. Write a note on derivation tree and explain the different methods for proving a given grammar ambiguous with example.

20. Construct a Turing machine for the language $L = \{a^n b^n : n \geq 1\}$
21. Convert the given grammar into Chomsky and Greibach Normal form
- $S \rightarrow AB/aB$
- $A \rightarrow aab/\lambda$
- $B \rightarrow bbA$

(6 x 2 = 12 Weightage)

PART C

(Short Essay Questions)

Answer any **three** questions. Each question carries 4 weightage.

22. Explain the closure properties of regular languages in detail.
23. Define NP complete language. Show that satisfiability problem is NP complete.
24. State and explain CYK algorithm with example.
25. Explain different models of Turing machine.
26. Let L be a CFG. Show that there exists a PDA, M such that $L = L(M)$.
27. a) State and prove the equivalence of deterministic and non-deterministic finite automata.
b) Explain Myhill-Nerode theorem.

(3 x 4 = 12 Weightage)

PART B

(Short Answer Questions)

Answer any six questions. Each question carries 2 weightage.

13. Explain the equivalence of type 0 grammars with Turing machines.
14. State and prove pumping lemma for context free languages with example.
15. Explain DFA state minimization.
16. Write a note on Chomsky hierarchy.
17. Explain the closure properties of recursively enumerable languages.
18. Explain Halting problem.
19. Write a note on derivation tree and explain the different methods for proving a given grammar ambiguous with example.