

D 93003

(Pages : 2)

Name

Reg. No.

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2015

(CUCSS)

Computer Science

CSS 1C 03—THEORY OF COMPUTATION

(2014 Admission onwards)

Time : Three Hours

Maximum : 36 Weightage

Section A

Answer all questions.

Each question carries 1 weightage.

1. Define Grammar.
2. What is meant by star-closure and positive-closure ? Give example.
3. Define Homomorphism.
4. Define Regular expression. Give example.
5. What is meant by left-linear and right-linear grammar ?
6. Define derivation tree.
7. Define Greibach Normal Form.
8. State Pumping Lemma for CFL's.
9. When we say a problem is decidable ? Give an example of undecidable problem.
10. Define recursive language.
11. Design a TM that accepts the language of odd integers written in binary.
12. Define NP-Complete problem. _____

(12 x 1 = 12 weightage)

Section B

Answer any six questions.

Each question carries 2 weightage.

13. Define NFA and DFA. Construct DFA for the language $L = \{w : |w| \bmod 3 = 0\}$ on $\{a, b\}$.
14. Write a note on automata.
15. Convert the grammar

S \rightarrow AB/aB,
A \rightarrow aab/ λ ,
B \rightarrow bbA.

into Chomsky normal form.

Turn over

16. Construct *npda* for accepting the language $L = \{ww^{\sim} : w \in \{a,b\}^*\}$.
17. Explain the different models of Turing machines.
18. Discuss Church's thesis.
19. Explain the halting problem. Is it decidable or undecidable problem ?
20. Show that the language L and its complement L' are both recursively enumerable if L is recursive.
21. Explain Cook's theorem.

(6 x 2 = 12 weightage)

Section C

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

22. State and prove Equivalence of deterministic and non-deterministic finite automata.
23. State and prove pumping lemma of regular language.
24. State and explain CYK algorithm with example.
25. What are the closure properties of CFL ? Write the proof for any *two* properties.
26. Explain deterministic, non-deterministic and multi tape Turing machines.
27. Prove that post correspondence problem is undecidable.

(3 x 4 = 12 weightage)