D 72941 **(Pages : 2)** **Name**

Reg. No. . . . . .

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2014

(CUCSS)

Computer Science

CSS 1C 03—THEORY OF COMPUTATION

(2014 Admissions)

Time : Three Hours **Maximum : 36 Weightage**

Part A

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

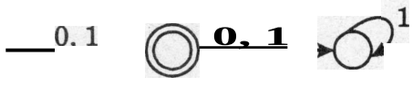
1. **Distinguish between NFA and DFA.**
2. **What is the principle of mathematical Induction ?**
3. **State the difference between sentence and sentential form.**
4. **State closure property of regular language.**
5. **Define Context-free grammar.**
6. **Give an example for Context sensitive language.**
7. **What is meant by Parsing ?**
8. **What are the applications of Turing machine ?**
9. **Define Recursively enumerable language.**
10. **What is meant by Multi tape Turing machine ?**
11. **What is meant by halting problem ?**
12. **Distinguish time and space complexities.**

(12 x 1 = 12 weightage)

Part B

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

13. **State and prove equivalence of NFA with and without ε-moves.**
14. **Convert the following NFA to DFA**



Turn over

15. State and prove pumping lemma for regular languages.
16. Find **DFA** that accepts the regular expression L (**aa* + aba * b ***).
17. Explain **:**
    (a) Derivation tree and partial derivation tree.
    (b) Ambiguous grammar and language.
18. Show that the language L = {$a^n b^n c^n d^n : n \geq 0$} is not **CFL.**
19. Explain **Chomsky** hierarchy of languages.
20. Explain the techniques for Turing machine construction. Illustrate with a simple example.
21. Explain post correspondence problem.

(6 x 2 = 12 weightage)

Part C

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

22. Prove that if a regular language **L** is accepted by an **NFA** then there exists **a DFA** to accept L.
23. Explain **Myhill Nerode** theorem with an example.
24. State pumping lemma for the existence of non-context free languages.
25. State and prove equivalence of **LBA** and Context Sensitive Grammar.
26. Explain the different models of Turing machines.
27. State and explain Cook's theorem.

(3 x **4 = 12 weightage**