19P163 (Pages: 2) Name: ………..……………

Reg. No……..………….....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2019
(CUCSS PG)
CC19P CSS1 C03 -THEORY OF COMPUTATION
(Computer Science)
(2019 Admission Regular)

Time: Three Hours   Maximum: 30 Weightage

PART A
Answer any *four* questions. Each question carries 2 weightage.

1. Describe the equivalence of type 0 grammar with Turing machine.

2. Elaborate the steps to convert a regulation expression into a DFA with suitable example.

3. What is an ambiguous grammar? Check whether the given grammar is ambiguous or not. $S \rightarrow aSbS / bSaS / \epsilon$

4. Write a note on time and space bounded simulations.

5. What is Chomsky Normal form? Simplify the following grammar by eliminating null productions, unit productions and useless symbols and then convert to Chomsky Normal Form.

    $S \rightarrow ABC / BaB$

    $A \rightarrow aA / BaC / aaa$

    $B \rightarrow bBb / a / D$

    $C \rightarrow CA / AC$

    $D \rightarrow \epsilon$

6. Explain the closure properties of recursive and recursively enumerable languages.

7. Explain the equivalence of deterministic and non-deterministic finite automata.

(4 x 2 = 8 Weightage)

PART B
Answer any *four* questions. Each question carries 3 weightage.

8. Prove that satisfiability is an NP Complete problem.

9. a) Equivalence of CSG and LBA.

    b) Find grammar for $\sum = \{a, b\}$ that generate the sets of all strings with exactly one a.

10. Explain the closure properties of regular languages in detail.

11. Give a detailed account of Chomsky hierarchy.

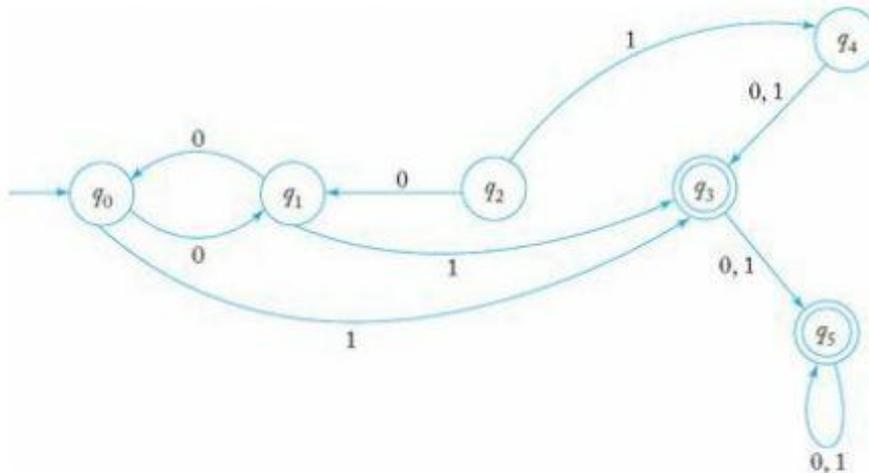12. Explain the concept of undecidability using halting problem.

13. What is a pushdown automation? Comment on the language accepting capabilities of a pushdown automation. Also construct a PDA for the language L= {$a^n b^n : n \geq 1$}.

14. Write a note on different proofing techniques with example.

(4 x 3 = 12 Weightage)

PART C
Answer any *two* questions. Each question carries 5 weightage.

15. Explain different models of Turing Machines in detail.

16. Describe:
    a) State and prove pumping lemma for CFL with example.
    b) Complexity classes P and NP with example.

17. Let L be a CFG. Show that there exists a PDA, M such that L=L(M).

18. Explain the algorithm for DFA state minimization and minimize the given DFA

(2 x 5 = 10 Weightage)

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