18P137 (Pages: 2) Name: …….

Reg. No……...

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(Regular/Supplementary/Improvement)

(CUCSS-PG)

CC17P CSS1 C03 - THEORY OF COMPUTATION

(Computer Science)

(2017 Admission onwards)

Time: Three Hours Maximum: 36 Weightage

PART A

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

1. Define Grammar.
2. What is Finite automata?
3. Distinguish between positive closure and Kleene closure.
4. Write a regular expression for the language $L = \{a^{2n}b^{2m+1} | n \geq 0, m \geq 0\}$
5. Construct a right and left linear grammar for the language $L = \{a^n b^m | n \geq 2, m \geq 3\}$
6. Write a CFG which generates palindrome for alphabets {a, b}.
7. Describe homomorphism with an example.
8. What is Context sensitive Grammar? Give an example.
9. What is meant by Greibach Normal Form?
10. Describe about Turing-Decidable and Turing Acceptable languages.
11. Differentiate Recursive and Recursive Enumerable Language.
12. What is Turing Machine halting problem?

(12 x 1 = 12 Weightage)

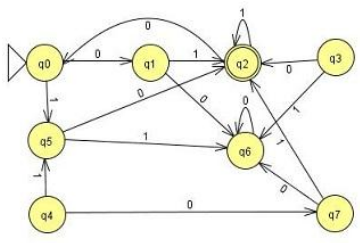
PART B

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

13. Design a DFA with transition table which accepts the following language

    L ={w | w has both an even number of 0's and an even number of 1's over alphabet ∑={0,1}}.

14. Explain the principle of Induction with an example.
15. Construct the minimum state automation equivalent to the following finite automation.



16. Construct the finite automata equivalent to regular expression $a(a+b)^*bb$.
17. Explain any four closure properties of regular set.
18. Describe about ambiguous context free grammar with an example.
19. Discuss Chomsky Normal Form. Reduce the following grammar G to Chomsky Normal Form.

    $S \rightarrow aAbB$

    $A \rightarrow aA \mid a$

    $B \rightarrow bB \mid b$
20. Design a Push Down Automata and Transition table to accept the following language.

    $L = \{ww_R \mid w \in \{a,b\}^*\}$ where w_R is the reverse of w.
21. State the Myhill Nerode theorem and explain with an example.

(6 x 2 = 12 Weightage)

PART C

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

22. (a) State and prove Pumping Lemma theorem for the context free languages .

    (b) Using Pumping Lemma Prove that $L = \{a^i b^i a^i \mid i \geq 1\}$ is not a CFL
23. State and Explain CYK algorithm with an example.
24. Discuss in detail Chomsky hierarchy.
25. (a) Construct a Turing machine accepting language $L = \{ww \mid w \in \{a,b\}^*\}$

    (b) Explain Rice Theorem.
26. (a) Explain Multi tape, Nondeterministic, Semi-Infinite Tape Turing machines.

    (b) Discuss church's thesis.
27. (a) Discuss in detail Derivation tree with examples.

    (b) Write short note on Post correspondence problem with an example.

    (c) Define NP, NP- hard, NP-Complete and P problems. Explain with examples.

(3 x 4 = 12 Weightage)

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