B.Sc. DEGREE EXAMINATION, NOVEMBER 2017.

III Year VI Semester

Core - ELECTIVE - FORMAL LANGUAGES AND AUTOMATA THEORY

Time : 3 Hours Max. Marks : 75

SECTION A – (10 × 2 = 20 marks)

Answer any *TEN* questions

1. Define a context-sensitive grammar.
2. Give an example for a context-free language.
3. Define Kleene closure of a language .
4. Consider the grammar . Construct a derivation tree for the word .
5. State Chomsky normal form theorem.
6. When do you say that a grammar is reduced?
7. Define a finite automaton.
8. Define -closure of a state .
9. If and , then find .
10. State Ogden’s lemma.
11. When do you say that a language id ambiguous?
12. Write regular expression for the language “set of all strings of ’s and ’s beginning with a 1 and not having consecutive ’s.

SECTION B – (5 × 5 = 25 marks)

Answer any *FIVE* questions

1. Find the language generated by the grammar where .
2. Show that the family of Context-free language is not closed under intersection.
3. Convert the context-free grammar where and in a an equivalent grammar in Chomsky normal form.
4. Prove that a language L is accepted by some DFA iff L is accepted by some NFA.
5. Show that the language is not context-free.
6. Given a context-free grammar , show that there exits an equivalent grammar with no rules of the form , . .
7. Construct an non-deterministic finite automaton for the regular expression .

SECTION C – (3 × 10 = 30 marks)

Answer any *THREE* questions

1. Construct a regular grammar to generate the language .
2. Define substitution on languages. Show that context-free language is closed under substitution.
3. Construct a context-free grammar in Greibach normal form to generate the language   
   .
4. Let be a set accepted by a nondeterministic finite automaton. Show that there exists a deterministic finite automaton that accepts L.
5. State and prove the pumping lemma for regular sets.

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