**B.Sc. DEGREE EXAMINATION, APRIL 2017**

**III YEAR — VI SEMESTER**

**Elective II — FORMAL LANGUAGES AND AUTOMATA THEORY**

**Time : 3 hours Max. marks : 75**

**SECTION A — (10 × 2 = 20 marks)**

**Answer any *TEN* questions.**

1. What is a formal language? Give an example.
2. Find the set of prefixes and set of suffixes of *w = abbab*.
3. What is a context – free language?
4. Give the derivation tree for the production *A 🡪 abABc*
5. What are useless symbols in a grammar?
6. When is a context free grammar said to be in Greibach normal form?
7. What is a finite automaton?
8. Define non – deterministic finite automaton.
9. What is a regular expression? Give an example.
10. Define regular grammar.
11. What is meant by transitions on the empty input?
12. If L1 = {10, 1} and L2 = {011, 11} find L1L2.

**SECTION B — (5 × 5 = 25 marks)**

**Answer any *FIVE* questions.**

1. What is a phrase structure language? Give an example.
2. Describe the Chomsky hierarchy.
3. Show that the language *L =* {*anbm ; n≠ m*} is context free.
4. Find a deterministic finite automaton that accepts all strings in {0, 1} except those containing the substring 001.
5. Find a regular expression for the language *L =* {*w* in *{0, 1*} such that *w* has no pair of consecutive zeros}*.*
6. Show that the family of regular languages is closed under union and complementation.
7. Show that the family of context free languages is not closed under intersection.

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions.**

1. Draw a diagram exhibiting the Chomsky hierarcy and give relevant examples to show the hierarchy.
2. Show that the family of context free languages is closed under star – closure.
3. Prove that any context free grammar has an equivalent Chomsky normal form.
4. Let *L* be a set accepted by a non deterministic finite automaton. Then prove that there exists a deterministic finite automaton that accepts *L*.
5. State and prove the pumping lemma for regular sets.

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