Academic Session 2018-2019

MC304 Theory of Computation

Assignment-II

1. Find the language generated by the grammar with production rules:

$$S \rightarrow 0S1|0A1, A \rightarrow 1A0|10$$

2. Construct a grammar,accepting $\{0^n1^m0^n|m, n \geq 1\} \cup \{0^n1^m2^m|m, n \geq 1\}$.

3. What is a context-free grammar?Construct a context-free grammar to generate the set of all strings over $\{0, 1\}$ containing twice as many $0's$ as $1's$.

4. What is a regular grammar?Construct a regular grammar to generate $\{(ab)^n|n \geq 1\}$.

5. Test whether $001100, 001010, 01010$ are in the language generated by the grammar with production rules:

$$S \rightarrow 0S1|0A|0|1B|1, A \rightarrow 0A|0, B \rightarrow 1B|1$$

6. Represent the following sets by regular expressions:
   (a) $\{a^2, a^5, a^8, \ldots\}$
   (b) $\{a^n|$n is divisible by 2 or 3 or n=5$\}$
   (c) The set of all strings over $\{a, b\}$ beginning and ending with a.

7. Show that the language $L = \{vwv : v, w \in \{a, b\}^*, |v| = 2\}$ is regular.

8. Find a regular expression for the language $L = \{w \in \{0, 1\}^* : w$ has no pair of consecutive zeros$\}$.

9. Prove the identity:

$$(a^*ab + ba)^*a^* = (a + ab + ba)^*$$

10. Show that the language $L = \{awa : w \in \{a, b\}^*\}$ is regular.