CROSS RIVER UNIVERSITY OF TECHNOLOGY, CALABAR
DEPARTMENT OF COMPUTER SCIENCE
FIRST SEMESTER EXAMINATIONS 2018/2019 SESSION

COURSE CODE: CSC 4101
COURSE TITLE: AUTOMATA THEORY 3 CREDITS **TIME: 3HRS**
ANSWER ANY FOUR QUESTIONS

1a. Explain the difference between alphabet and set of symbols. What is lexicography? How are symbols defined in a programming language? Give examples of symbols used in C++.

b. Given a finite set of symbols A, define strings, powers of symbol sets and string length. What are A* and A+?

c. Give Chomskij's definition of grammars. What are rewrite rules? Define regular grammars and regular expressions.

2a. Describe Chomskij's grammar types. Explain decidability of grammars. What types of grammars are used in programming languages?

b. What is semi-decidable grammar. What is the problem with semi-decidability?

c. Why is Turing's machine is used to formulate the terms semi-decidable and decidable?

3a. Define a deterministic finite automata (DFA). Define a string pointer and current symbol.

b. Describe the operation of a DFA. When will a DFA reject a string?

c. Explain the meaning of an automaton accepts a string.

4a. Define a non-deterministic finite automaton (NFA). Define $\in$-transitions and their input symbol handling.

b. Explain when is an NFA accepting an input string and when is it rejecting it.

c. Give an example of an NFA that accepts an input string that is built from three a|b (read "a or b) characters (e.g. aaa# or aba# etc).

5a. Describe the NFA structure to accept an "or" expression of input symbols (two symbols).

b. Define non-negative octal numbers in terms of regular grammar and create an NFA that accepts a non-negative octal number.

c. Create an NFA that accepts the repeated symbol sequence "aba" (e.g. aba#, abaaba# etc).

6a. Define the set of transitions on an input symbol from a set of states A – like Tr (A, c).

b. Define $\in$-closure of a set of states.

c. What is optimization of a DFA created from an NFA?