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**NATIONAL OPEN UNVERSITY OF NIGERIA**

**University Village, Plot 91, Cadastral Zone,**

**Nnamdi Azikiwe Expressway, Jabi, Abuja**

FACULTY OF SCIENCES

**JULY 2018 EXAMINATIONS**

***Course Code:*** CIT342 3 Units

***Course Title:*** Formal Languages and Automata Theory

***Time Allowed:*** 3 Hours

***Instruction:*** Answer Question 1 (22 marks) and any other four questions (12 marks each)

1a) With the aid of diagram, briefly describe the automata theory (8 marks)

1b) Clearly **s**tate the Godel incompleteness theorem (5 marks)

1c) Briefly explain the following terms: (9 marks)

1. halting problem (ii) Decision Problem (iii) Formal language

2a)List the three ways of defining a language (3marks)

2b) Define the following terms (6 marks)

2c) List the three ways of Defining a language (3 marks)

3a) In a formal way, describe an automaton (6 marks)

3b) Explain the Regular Expressions (3 marks)

3c) Define context-sensitive grammars (3 marks)

4a) List 6 types of Automata (6 marks)

4b) As touching regular expressions, state the precedence of the following operations relative to one another (3 marks)

1. Kleene Star
2. Concatenation
3. Union

4c)When is a grammar recursively enumerable? (3 marks)

5a) List and define the two types of Push Down Automata (4 marks)

5b) A formal system can be regarded (i) complete; or (ii) incomplete. Discuss (5 marks)

5c)Considering that an automaton as a computer, state the way(s) it can handle non-determinism (3 marks)

6a) Distinguish between regular grammar and context-free grammar (4 marks)

*6b****)*** State **two** of the ways of implementing a DFA. (4 marks)

6c) Explain the two types of Push Down Automata (4 marks)