NATIONAL OPEN UNIVERSITY OF NIGERIA
Plot 91, Cadastral one, Nnamdi Azikiwe Expressway, Jabi, Abuja
FACULTY OF COMPUTING

Computer Science Department
2024_2 EXAMINATION

PROGRAMME: **B.Sc.**
COURSE TITLE: **FORMAL LANGUAGES AND AUTOMATA THEORY**
COURSE CODE: **CIT342**
CREDIT UNIT: **3**
DURATION: **2½ HRS**

Instructions: Answer Question ONE (1) and any other three questions

1(a) Define PDA as a 7 tuple ***(7 marks)***
(b) State the 5-tuple of Automaton and discuss the relationship between automata theory and formal language theory? ***(13 marks)***
(c) Highlight variations in the definition of the components of automata. ***(5 marks)***

2(a) State the languages defined by the primitive regular expressions: (***8 marks)***
(b) In a tabular form, list 7 types of automata and their respective recognizable languages ***(7 marks)***

3(a) What is deductive proof? (***3 marks)***
(b) Explain the operation of a grammar in relation to relations and Strings (***12 marks)***

4 (a) Define briefly on the following
i) A turning machine ii) A regular expression (***8 marks)***
(b) Sketch a rough algorithm to implement an NFA by means of a recursive search from the start state for a path to a final state. (***7 marks)***

5(a) Outline the algorithm for the operation of a deterministic finite acceptors/automat (DFA) ***(10 marks)***

b) With the aid of a diagram show the connection between the right-linear grammars and NFAs, (***5 marks)***

6(a) Prove that any language generated by an unrestricted grammar is recursively enumerable. ***(6 marks)***
(b) With examples discuss the standard operations on Languages (***9 marks)***