



**NATIONAL OPEN UNIVERSITY OF NIGERIA  
JABI FCT ABUJA  
FACULTY OF SCIENCE  
OCTOBER/NOVEMBER 2016 EXAMINATION**

**CIT342: Formal Languages and Automata Theory**  
**TIME ALLOWED: 3Hours**

**INSTRUCTION(S): Attempt any Five (5) questions**

**Question 1**

- i) What is a context-free grammar? – 7 marks
- ii) In compiler construction, when is grammar said to be ambiguous? - 7 marks

**Question 2**

- i) Describe the Chomsky hierarchy - 10 marks
- ii) Enumerate the conditions for a regular language? - 4 marks

**Question 3**

- i) Distinguish among the following grammar types: (3 marks each = 9)
  - a. Regular grammars
  - b. Context-free grammars
  - c. Analytical grammars.
- ii) Give at least 4 examples of analytic grammar formalisms that you know – 5 marks

**Question 4**

- i) Briefly explain the halting problem - 7 marks
- ii) State Godel's incompleteness theorem - 7 marks

**Question 5**

- i) What is a Turing Machine? - 7 marks
- ii) Distinguish between deterministic and nondeterministic pushdown automata - 7marks

**Question 6**

- i) What is a PDA? - 7 marks
- ii) If languages  $L_1$  and  $L_2$  are each given in a standard representation prove that the languages ( $L_1$  and  $L_2$ ) are identical -7 marks

**Question 7**

- i) Develop an algorithm for the Operation of a DFA 8 marks
- ii) Write shorts notes on any 3 of the following terms 6 marks
  - a. *Transducer*
  - b. An automaton
  - c. Set Intersection